



National Standard of the People's Republic of China

GB/T 5237.4—2017
Replace GB/T 5237.4—2008

Wrought aluminum alloy extruded profiles for architecture—Part 4: Powder coating profiles

铝合金建筑型材 第4部分:喷粉型材

(English Translation)

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Foreword

SAC/TC 243 is in charge of this English translation. In case of any doubt about the contents of English translation, the Chinese original shall be considered authoritative.

The GB/T 5237 *Wrought aluminum alloy extruded profiles for architecture* consists of the following six parts under the general title:

- Part 1: *Mill finish profiles*;
- Part 2: *Anodized profiles*;
- Part 3: *Electrodeposition coating profiles*;
- Part 4: *Powder coating profiles*;
- Part 5: *Paint coating profiles*;
- Part 6: *Thermal barrier profiles*.

This is the fourth part of GB/T 5237.

This part is drafted in accordance with the rules given in the GB/T 1.1—2009.

This part replaces the GB/T 5237.4—2008 *Wrought aluminum alloy extruded profiles for architecture—Part 4: Powder coating profiles* in whole. In addition to a number of editorial changes, the following technical deviation have been made with respect to the GB/T 5237.4—2008:

- Revised the standard name (See cover, the cover of GB/T 5237.4—2008);
- Deleted the statement in the foreword “In this part, article 4.5.3.1 and 4.5.5 are compulsory. Other contents are recommended.” (See the foreword of 2008 edition);
- Revised the applicable scope of this part (See clause 1, clause 1 of GB/T 5237.4—2008);
- Delete the normative references GB/T 228—2002 (See clause 2 and subclause 5.2 of GB/T 5237.4—2008);
- Deleted the normative references JC/T 480 (See clause 2 and subclause 5.4.12 of GB/T 5237.4—2008);

- Deleted the normative references GB/T 16585 (See clause 2 of GB/T 5237—2008);
- Added normative references GB/T 5237.2 (See clause 2 and subclause 7.3);
- Added normative references GB/T 8005.3 (See clause 2 and clause 3);
- Added normative references GB/T 14684 (See clause 2 and subclause 5.4.12);
- Added normative references JC/T 479 (See clause 2 and subclause 5.4.12);
- Added the normative references YS/T 680—2016 (See clause 2 and Annex A);
- Revised the normative references GB/T 1865—1997 into GB/T 1865—2009 (See clause 2 and subclause 5.4.18.1);
- Revised the normative references GB/T 8013.3—2007 into normative reference documents without year number (See clause 2, subclause 4.6.19, 5.4.10, 5.4.13, 5.4.19 and subclause 6.5, clause 2, 3, subclause 4.2, 4.5.18, 5.4.18 and subclause 6.4 of GB/T 5237.4—2008);
- Added normative references GB/T 26323 (See clause 2 and subclause 5.4.16);
- Revised the provision of “Terms and definitions” (See clause 3, clause 3 of GB/T 5237.4—2008);
- Revised definition of “Exposed surface” (See subclause 3.1, subclause 3.2 of GB/T 5237.4—2008);
- Deleted the “Coating” definition (See subclause 3.1 of GB/T 5237.4—2008);
- Deleted the definition of “Local thickness” (See subclause 3.3 of GB/T 5237.4—2008);
- Delete the definition of “Minimum local thickness” (See subclause 3.4 of GB/T 5237.4—2008);
- Added the content of “coating types and characteristics”, in the “Classification” (See subclause 4.1.2);
- Added the content of “Coating appearance” in the “Classification” (See subclause 4.1.3);
- Added the content of “Coating performance grade and corresponding application environment”, in the “Classification” (See subclause 4.1.4);
- Added the content of “Quality assurance” (See subclause 4.2);
- Revised the provision and method requirement of “Boiling water resistance” (See subclause 4.6.6 and subclause 5.4.6, subclause 4.5.10 and subclause 5.4.10 of GB/T 5237.4—2008);

- Revised the provision and method requirement of “Impact resistance” (See subclause 4.6.7 and subclause 5.4.7, subclause 4.5.6 and subclause 5.4.6 of GB/T 5237.4—2008);
- Revised the provision and method requirement of “Cupping resistance” (See subclause 4.6.8 and subclause 5.4.8, subclause 4.5.7 and subclause 5.4.7 of GB/T 5237.4—2008);
- Revised the provision and method requirement of “Bend resistance” (See subclause 4.6.9 and subclause 5.4.9, subclause 4.5.8 and subclause 5.4.8 of GB/T 5237.4—2008);
- Revised the provision and method requirements of “Salt spray corrosion resistance” (See subclause 4.6.15, subclause 4.5.15 of GB/T 5237.4—2008);
- Added the provision and method requirement of “Filiform corrosion” (See subclause 4.6.16 and subclause 5.4.16);
- Revised the provision and method requirements of “Heat and constant climate condensation water test or humidity resistance” (See subclause 4.6.17, subclause 4.5.16 of GB/T 5237.4—2008);
- Revised the provision and method requirements of “Accelerated weathering resistance” (See subclause 4.6.18.1, subclause 4.5.17.1 of GB/T 5237.4—2008);
- Revised the provision and method requirements of “Natural exposure resistance” (See subclause 4.6.18.2, subclause 4.5.17.2 of GB/T 5237.4—2008);
- Revised the provision and method requirement of “Chemical composition” (See subclause 5.1, subclause 5.1 of GB/T 5237.4—2008);
- Revised the provision and method requirement of “Mechanical properties” (See subclause 5.2, subclause 5.2 of GB/T 5237.4—2008);
- Revised the test method requirement of “Abrasion resistance” (See subclause 5.4.10, subclause 5.4.9 of GB/T 5237.4—2008);
- Revised test method and requirement of “Solvent resistance” (See subclause 5.4.13, subclause 5.4.13 of GB/T 5237.4—2008);
- Added requirement of “width of the scratch is 1 mm” in the salt spray corrosion resistance test (See subclause 5.4.15, subclause 5.4.15 of GB/T 5237.4—2008)
- Revised inspection method and requirement of “Batch” (See subclause 6.2, subclause 6.2 of GB/T 5237.4—2008);
- Added the provisions of inspection classification (See subclause 6.3)

- Revised the provisions of “Inspection items” (See subclause 6.4, subclause 6.3 of GB/T 5237.4—2008);
- Added “Process assurance projects” (See subclause 6.4);
- Revised “Sampling” provision (See subclause 6.5, subclause 6.4 of GB/T 5237.4—2008);
- Revised requirements for “rejection and retest” (See subclause 6.6, subclause 6.5 of GB/T 5237.4—2008);
- Revised the provision of “Marking”(See subclause 7.1, subclause 7.1 of GB/T 5237.4—2008);
- Revised the content of “Quality certificate” (See subclause 7.4, subclause 7.5 of GB/T 5237.4—2008);
- Revised the “Contract(or purchase order) content” (See clause 8, clause 8 of GB/T 5237.4—2008);
- Deleted the Annex of “Sand-falling testing method” (See “Annex A” of GB/T 5237.4—2008);
- Deleted the Annex of “Solvent resistance test” (See “Annex B” of GB/T 5237.4—2008);
- Added the Annex of “Quality assurance” (information documents) (See “Annex A”);
- Added the content of “Bibliography” (See “Bibliography”)

This part was proposed by China Non-ferrous Metals Industry Association.

This part was prepared by SAC/TC 243 State Administration of China for Standardization of nonferrous Metals.

The previous editions of GB/T 5237.4 are as follows:

- GB/T 5237.4—2000, GB 5237.4—2004, GB/T 5237.4—2008.

Wrought aluminum alloy extruded profiles for architecture—Part 4: Powder coating profiles

1 Scope

This part of GB/T 5237 specifies terms, definitions, requirements, test method, accordance with standards, marking, packaging, transporting, storing, quality certificate and contents of order (or contract) of wrought aluminum alloy extruded profiles with powder coating for architecture.

This part is applicable to the electrostatic powder coating wrought aluminum alloy extruded profiles for architecture (hereinafter referred profiles), whose coating is formed of polyester, polyurethane, chlorotrifluoroethylene-vinyl ether (FEVE) thermosetting powder coating and poly vinylidene fluoride (PVDF) thermoplastic powder coating.

Wrought aluminum alloy extruded profiles with the same surface treatment and of the same use for other industries may also refer to this part.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 1732, *Determination of impact resistance of film*

GB/T 1740, *Determination of resistance to heat and humidity of paint films*

GB/T 1865—2009, *Paints and varnishes—Artificial weathering and exposure to artificial radiation—Filtered Xenon-arc radiation*

GB/T 3199, *Wrought aluminium and aluminium alloy products—Packing, marking, transporting and storing*

GB/T 4957, *Non-conductive coatings on non-magnetic basis metals—Measurement of coating thickness—Eddy current method*

GB/T 5237.1, *Aluminum alloy extruded profiles for architecture—Part 1: Mill finish profiles*

GB/T 5237.4—2017

GB/T 5237.2, Wrought aluminum alloy extruded profiles for architecture—Part 2 : Anodized profiles

GB/T 6682, Water for analytical laboratory use—Specification and test method requirements

GB/T 6742, Bend test for film (cylindrical mandrel)

GB/T 8005.3, Aluminium and aluminium alloys—Terms and definitions—Part 3 : Surface treatment

GB/T 8013.3, Pre-anodized coatings and organic polymer coatings on aluminum and its alloys—Part 3 : Organic polymer coatings

GB/T 9275, Paints and varnishes—Buchholz indentation test

GB/T 9276, Methods of exposure to natural weathering test of coating

GB/T 9286, Paints and varnishes—Cross-cut test for films

GB/T 9753, Paints and varnishes—Cupping test

GB/T 9754, Paints and varnishes—Measurement of specular gloss of non-metallic paint films at 20°, 60° and 85°

GB/T 9761, Paints and varnishes—Visual comparison of the color of paints

GB/T 10125, Corrosion test in artificial atmospheres—Salt spray test

GB/T 11186.2, Methods for measuring the color of paints film—Part 2 : Color measurement

GB/T 11186.3, Methods for measuring the color of paints film—Part 3 : Calculation of color differences

GB/T 14684, Architectural sand

GB/T 17671, Method of testing cements—Determination of strength

GB/T 26323, Paints and varnishes—Determination of resistance to filiform corrosion on aluminum and aluminum alloys

JC/T 479, Architectural quick lime

YS/T 680—2016, Powder coating for wrought aluminum alloy extruded architecture profiles

3 Terms and definitions

For the purposes of this document, the terms and definitions given in GB/T 8005.3 and the following apply.

3.1

exposed surfaces

visible surfaces of profiles after they are machined, assembled and installed in the architecture, including opened or closed products

4 Requirements

4.1 Classification

4.1.1 Alloy, temper and dimension

The alloy, temper and dimension shall be in accordance with the requirements given in GB/T 5237.1.

4.1.2 Coating types and characteristics

Coating types and characteristics are specified in Table 1.

Table 1—Coating types and characteristics

coating type	coating code ^a	coating characteristics
polyester powder coating	GA40	Powder is mainly formed of saturated carboxyl resin, after curing, the coating have better weathering and corrosion resistance
poly urethane powder coating	GU40	Powder is mainly formed of saturated hydroxyl resin, after curing, the coating have better abrasion resistance and smooth surface. Ink penetration is better than that of carboxyl polyester in the application of sublimation
fluorocarbon powder coating	GF40	Powder is mainly formed of thermosetting FEVE resin or thermoplastic PVDF resin, after curing, the coating have excellent weathering resistance. Suitable for severe corrosion and strong solar radiation environment
other powder coating	GO40	See YS/T 680—2016

^a Coating Code description: The first English letter in the code represents electrostatic powder spraying; second English letters represents powder coating type, wherein “A” represents pure polyester powder coating, “U” represents polyurethane powder coating, “F” represents fluorocarbon powder coating, “O” represents other powder coating types; the suffix number represents of the minimum coating thickness.

4.1.3 Coating appearance

Coating appearance is given in Table 2.

Table 2—Coating appearance

coating appearance		notes
smooth		Low-gloss, matt, satin and high gloss, with smooth surface, rich colors
texture effect	sand texture	Coating surface has a structured effect. Applicable to most aluminum doors and windows, the gloss shall not be less than 5 units, to ensure coating performance
	wood grain	Including sublimation and powder on powder technology with wood grain appearance. The thermal transfer coating is mainly used in less pollution and weak ultraviolet radiation environment, when used outside, more attention shall be paid for the quality and processes of both ink and powder coating. Powder on powder process has the structured effect, suitable for outdoor use
	hammer, wrinkle, marble effect, structured colour carving	The surface of the coating shows a variety of good structure or art effects. But this kind of coating has slightly worse weathering resistance, acid and alkali resistance, and mainly for indoor use
metallic effect		With metallic or sparkling effect. But the varieties and dosage of metallic pigments have certain limitations. Coating containing aluminum pigment is not good for alkaline resistance

4.1.4 Coating performance class and corresponding profile application environment

According to the result of accelerated weathering resistance, coating performance classes are divided into I, II and III. The coating performance class shall be agreed upon between the customer and the supplier, and given in the order (or contract). If not specified, it shall be supplied in accordance with class I. Coating performance class and corresponding profile application environment are specified in Table 3.

Table 3—Coating performance class and corresponding profile application environment

coating performance grade	application Environment
III	Excellent weathering resistance, suitable for strong UV light exposure environment
II	Good weathering resistance, suitable for the relatively strong UV light exposure environment
I	Normal weathering resistance, suitable for the generally UV light exposure environment

4.1.5 Marking and example

The marking of products shall be expressed in the order of product name, the standard number of this part, alloy, temper, section code and length, color (or color number), coating performance class, coating code. Example of marking is listed as follows:

Aluminium profiles, which are made of alloy 6063, temper T5, section code 421001, specified length 6 000 mm, color of 3003, coating performance class I, and coating code of GU40, are marked as:

Powder coated profile GB/T 5237.4-6063T5-421001 × 6 000, 3003 colour, class I, GU40

4.2 Quality assurance

4.2.1 Process

Process assurance sees A.1.

4.2.2 Raw material

The quality requirements of mill finish profile, pretreatment chemical agent and powder coating see A.2.

4.3 Chemical composition

The chemical composition shall be in accordance with GB/T 5237.1.

4.4 Mechanical properties

The mechanical properties shall be in accordance with GB/T 5237.1.

4.5 Dimension tolerance

The tolerance on dimensions of profiles shall be in accordance with GB/T 5237.1 after removing the coating layer, the change of the dimension caused by the coating shall not affect assembly and use of profiles.

4.6 Performances of coating

4.6.1 Coating thickness

4.6.1.1 The local thickness of coating on exposed surfaces shall be not less than 40 μm. The average coating thickness shall be controlled at 60 μm—120 μm. Due to the existence of complex shapes of profile extrusion, coating thickness of special surface such as inner angle or channel section is allowa-

ble to be less than the specified value. Other special requirements on the coating thickness can be agreed upon the supplier and the customer, and specified in the order (or contract).

NOTE Thicker coating thickness will cause the decrease of coating flexibility.

4.6.1.2 If the non-exposed surface requires coating thickness, it shall be agreed by the supplier and the purchaser, and specified in the order (or contract).

4.6.2 Gloss

The gloss value of coating and its permissible deviation is specified in Table 4.

Table 4—Gloss value of coating and its permissible deviation In gloss unit

range of gloss value	permissible deviation of gloss value
3—30	± 5 units
31—70	± 7 units
71—100	± 10 units

4.6.3 Colour difference

The colour shall be basically consistent with color samples agreed between the customer and the supplier. When evaluate the colour by instrument test the colour difference ΔE_{ab}^* between the solid colour coating and the sample shall be not more than 1.5 and the colour change ΔE_{ab}^* of profiles in the same batch shall be not more than 1.5.

4.6.4 Indentation

After indentation hardness test, the indentation of coating shall not be less than 80.

4.6.5 Adhesion

Dry adhesion, wet adhesion and boiling water adhesion shall meet grade 0.

4.6.6 Boiling water resistance

After high pressure water immersion test, no detachment or wrinkle exist on the coating surface, but some dispersive minute blisters are acceptable, adhesion shall meet grade 0.

4.6.7 Impact resistance

4.6.7.1 For class I powder coating, the coating shall not show any sign of cracking or detachment

after impact test.

4.6.7.2 For class II and class III powder coating, slightly cracking after impact test is acceptable. If the adhesive tape¹⁾ which has adhesive power of 10 N/25 mm (or more) is applied to further examination, the coating shall not show any sign of detachment.

NOTE Pre-anodized coating is not applicable for impact test.

4.6.8 Cupping resistance

4.6.8.1 For class I powder coating, the coating shall not show any sign of cracking or detachment after cupping test.

4.6.8.2 For class II and class III powder coating, slightly cracking after cupping test is acceptable. If the adhesive tape which has adhesive power of 10 N/25 mm (or more) is applied to further examination, the coating must not show any sign of detachment.

NOTE Pre-anodized coating is not applicable for cupping test.

4.6.9 Bend resistance

4.6.9.1 For class I powder coating, cracking or detachment is not allowed after bend test.

4.6.9.2 For class II and class III powder coating, slightly cracking after bend test is acceptable. If the adhesive tape which has adhesive power of 10 N/25 mm (or more) is applied to further examination, the coating shall not show any sign of detachment.

NOTE Pre-anodized coating is not applicable for bend test.

4.6.10 Abrasion resistance

After sandfalling test, abrasion coefficient shall not be less than 0.8 L/ μm .

4.6.11 Hydrochloric acid resistance

After hydrochloric acid resistance test, the coating surface shall not exist any blister and other obvious changes.

4.6.12 Mortar resistance

After mortar resistance test, the coating surface shall not exist any detachment and other obvious changes.

1) Scotch 610 adhesive tape or Permacel 99 adhesive tape is an example of commercially available products. This information is only for the convenience of user of this part. It does not mean that these products are recognized.

4.6.13 Solvent resistance

The result of solvent resistance test should be grade 3 or 4.

4.6.14 Detergent resistance

After detergent resistance test, the coating surface shall not exist any blister, detachment and other obvious changes.

4.6.15 Salt spray corrosion resistance

After Salt spray corrosion resistance test, the length of any single infiltration shall not exceed 4 mm. There shall be no corrosion on the coating surface beyond 4 mm both sides of the lineation.

4.6.16 Filiform corrosion

When filiform corrosion resistance is demanded by purchaser, it shall be agreed upon between the purchaser and the supplier, and specified in the order (or contract). The coefficient of filiform corrosion (f_s) should not be more than 0.3, and the corrosion fibril length should not be more than 2 mm.

4.6.17 Humidity resistance

After Humidity resistance test, the comprehensive damage grade of the coating surface shall meet grade 1.

4.6.18 Weathering resistance

4.6.18.1 Accelerated weathering resistance

The accelerated weathering resistance of coating is specified in Table 5.

Table 5—Accelerated weathering resistance

class	test time	test results	
		gloss retention ^a	colour differences value
III	4 000 h	$\geq 75\%$	$\Delta E_{ab}^* \leq 3$
II	1 000 h	$\geq 90\%$	$\Delta E_{ab}^* \leq$ specified value in Annex D of YS/T 680—2016
I	1 000 h	$\geq 50\%$	$\Delta E_{ab}^* \leq 50\%$ of specified value in Annex D of YS/T 680—2016

^a Gloss retention is the percentage of the gloss value after test to the gloss value before test.

4.6.18.2 Natural exposure resistance

If the natural exposure resistance is required by the purchaser, select the proper grade of natural exposure (specified in Table 6) and agreed test conditions should be selected, and it shall be specified in the order (or contract).

Table 6—Results of natural exposure test

natural exposure class	testing time ^a	test result	
		gloss retention ratio	colour difference value
Ⅲ	5 years	$\geq 50\%$	$\Delta E_{ab}^* \leq$ specified value in Annex D of YS/T 680—2016
Ⅱ	3 years	$\geq 50\%$	$\Delta E_{ab}^* \leq$ specified value in Annex D of YS/T 680—2016
I	1 year	$\geq 50\%$	$\Delta E_{ab}^* \leq$ specified value in Annex D of YS/T 680—2016
^a Testing time can be different at different atmospheric corrosion test station, but it must not be less than the time specified in this table.			

4.6.19 Others

If other performance is required by the customer, it shall be subject to agreement between the supplier and the purchaser according to GB/T 8013.3, and it shall be specified in the order (or contract).

4.7 Appearance

The coating on the exposed surface of profile shall be smooth and uniform, slight orange peel is acceptable, and defects affecting the use is not allowed such as wrinkles, runs, blisters, cracking.

5 Test methods

5.1 Chemical composition

The analysis method of chemical composition shall be in accordance with GB/T 5237.1. Before the test is carried out, the coating layer on the surface of the sample shall be removed.

5.2 Mechanical properties

The mechanical properties test method shall be in accordance with GB/T 5237.1. Before the test is carried out, the coating layer on the surface of the sample shall be removed.

5.3 Dimension tolerance

The dimension tolerances test method shall be in accordance with GB/T 5237.1. Before the test is carried out, the coating layer on the surface of the sample shall be removed.

5.4 Performance of coating

5.4.1 Coating thickness

Measurement of coating thickness shall be in accordance with GB/T 4957.

5.4.2 Gloss

The measurement of gloss shall be carried out with gloss meter at 60° in accordance with GB/T 9754.

5.4.3 Colour differences

The measurement of colour differences is usually based on visual and instrumental methods, visual method is as specified in the GB/T 9761. The instrument is as specified in GB/T 11186.2 and GB/T 11186.3. Referee test of solid colour coating is the instrumental method.

5.4.4 Indentation hardness

Indentation hardness test shall be in accordance with GB/T 9275.

5.4.5 Adhesion

5.4.5.1 Dry adhesion

5.4.5.1.1 Make cross-cut in accordance with GB/T 9286, the cross-cut parallel spacing is 2 mm.

5.4.5.1.2 Cover the cut area of the specimen surface with adhesive tape which has adhesive power of 10 N/25 mm (or more). Press the tape firmly to eliminate air bubbles, and take the tape off perpendicularly from the specimen immediately. Then evaluate the adhesion of paint films according to GB/T 9286.

5.4.5.2 Wet adhesion

Make cross-cut in accordance with 5.4.5.1.1, and immerse specimen in the $38\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ water of Class 3 specified in GB/T 6682 for 24 hours. Take the specimen out and wipe it dry, then test and evaluate the specimen in 5 min according to 5.4.5.1.2.

5.4.5.3 Boiling water adhesion

5.4.5.3.1 Make cross-cut in accordance with 5.4.5.1.1.

5.4.5.3.2 Add Water of class 3 specified in GB/T 6682 to a depth of about 80 mm in the beaker, and add 2 or 3 clean ceramic chips. Then heat the bottom of beaker until the water boil.

5.4.5.3.3 Immerse specimen in the boiling water and keep 20 min, keeping it at a position of 10 mm below the surface of water, but not contacting the bottom of beaker. During the test the temperature of water shall be below 95 °C and the depth of water shall be maintained no less than 80 mm by pouring boiling water of class 3 specified in GB/T 6682 at any moment.

5.4.5.3.4 Take the specimen out and wipe it dry. Then test and evaluate the specimen in 5 min according to 5.4.5.1.2.

5.4.6 Boiling water resistance

Add water of Class 3 specified in GB/T 6682 to a depth of about 80 mm into the autoclave, immerse about 50 mm long specimen in the water vertically, 10 mm below the water without contacting the bottom of the container, heat water to the pressure up to 0.1 MPa \pm 0.01 MPa and keep 1 h with constant pressure, take out and wipe specimen dry, inspect the film surface change visually, adhesion test and rating is carried out according to 5.4.5.1 after specimen is taken out 5 min later.

5.4.7 Impact resistance

5.4.7.1 Method of making the standard test panels: select pure aluminum sheet with the dimension of 150 mm \times 75 mm \times 1.0 mm, the temper of H24 or H14, with the batch number of profiles using the same processes and curing, in the same production line (keeping the coating thickness in range of 40 μ m—80 μ m), then condition the panel for 24 h.

5.4.7.2 Impact resistance test shall be in accordance with GB/T 1732, and the impactor diameter is 16 mm \pm 0.3 mm. Let the impactor (1 000 g \pm 5 g) fall freely at a certain height to impact the coated side (direct impact) and the depth of concave area shall be 2.5 mm \pm 0.3 mm and visual inspect the changes of the coating in periphery of the concave after impact resistance test.

5.4.7.3 For class II and class III powder coated standard test panels, immediately cover the adhesive tape which has adhesive power of 10 N/25 mm (or more) on the impacted surface of the specimen after impact test, pressing down firmly against the coating to eliminate air bubble under the tape, and immediately pull the tape off perpendicularly from the specimen. Then evaluate the adhesion of coating.

5.4.8 Cupping resistance

5.4.8.1 Cupping resistance test shall be in accordance with GB/T 9753 (as specified in 5.4.7.1), using standard test panel, with indentation depth of 5 mm visual inspect the changes of the coating in periphery of the concave after cupping resistance test.

5.4.8.2 For class II and class III powder coated standard test panels, immediately cover the adhesive tape 1) which has adhesive power of 10 N/25 mm (or more) on the impacted surface of the panel after cupping test, pressing down firmly against the coating to eliminate air bubble and immediately pull the tape off perpendicularly from the specimen. Then evaluate the adhesion of coating.

5.4.9 Bend resistance

5.4.9.1 Bend resistance test shall be carried out according to GB/T 6742 (as specified in 5.4.7.1), using standard test panel, radius of curvature is 3 mm mandrel. Visual inspect changes of the periphery area after bending resistance test.

5.4.9.2 For class II and class III powder coated standard test panels, immediately cover the adhesive tape which has adhesive power of 10 N/25 mm (or more) on the impacted surface of the panel after bending test, pressing down firmly against the coating to eliminate air bubbles under the tape and immediately pull the tape off perpendicularly from the specimen. Then evaluate the adhesion of coating by visual.

5.4.10 Abrasion resistance

Sand falling test shall be carried out as specified in GB/T 8013.3, and the abrasive shall be standard sand as specified in GB/T 17671.

5.4.11 Hydrochloric acid resistance

Prepare hydrochloric solution mixed with analytically pure hydrochloric acid ($\rho = 1.19$ g/mL) and class 3 specified in GB/T 6682 as the volume proportion of 1 : 9. Drop ten drops of hydrochloric solution on the paint film surface of specimen and cover it with watch glass. Keep it at 18 °C—27 °C for 15 min. At the end of test rinse the specimen with tap water and make it dry. Then, visual inspect the coating surface.

5.4.12 Mortar resistance

5.4.12.1 Mix 75 g architectural quicklime specified in JC/T 479 and 225 g construction sand specified in GB/T 14684, then add 100 g water of class 3 specified in GB/T 6682 to make pasty mortar.

5.4.12.2 Put the pasty mortar on the specimen surface, heap it up to cylindrical shape with the size of 15 mm ϕ \times 6 mm h . Then keep it at 38 °C \pm 3 °C and relative moisture 95% \pm 5% for 24 h.

5.4.12.3 Remove the mortar and erase the residues on the surface with wet cloth and make it dry. Inspect visually the coating surface after the test.

5.4.13 Solvent resistance

Solvent resistance test shall be carried out as specified in the rubbing method of GB/T 8013.3.

5.4.14 Detergent resistance

5.4.14.1 Prepare test solution (30 g/L) with detergent whose compositions are shown in Table 7 and class 3 specified in GB/T 6682. Place the specimens in the detergent solution at $38\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ for 72 h, and then take the specimens out and wipe them dry.

Table 7—Detergent composition

composition	mass fraction/%
tetrasodium pyrophosphate	53
sodium sulphate anhydrous	19
sodium linear alkylarylsulfonate	20
sodium metasilicate hydrated	7
sodium carbonate anhydrous	1
total	100

5.4.14.2 Cover the cut area of the specimen surface with adhesive tape which has adhesive power of 10 N/25 mm (or more). Press the tape firmly to eliminate air bubbles, and tear the tape off perpendicularly from the specimen immediately, inspect visually on the surface of coatings after the test.

5.4.15 Salt spray corrosion resistance

Made a cross-cut incision deep into the substance along the opposite angle of specimen, the width is 1 mm and the distance between end-point of each incision and corresponding angle shall be equal, then the AASS test shall be in accordance with GB/T 10125. For class I and class II powder coating, test time is 1 000 h, and for class III powder coating, test time is 2 000 h. Measure the infiltration of each side of the lineation. Check whether there is corrosion on coating surface beyond 4.0 mm both sides of the lineation.

5.4.16 Filiform corrosion resistance

Test shall be in accordance with GB/T 26323.

Calculation of the filiform corrosion frequency E_s is as specified in formula (1).

Calculation of filiform corrosion coefficient f_s is as specified in formula (2).

$$E_s = n/l \quad \dots\dots\dots (1)$$

where

E_s is the fibril frequency, in stripe per mm;

n is the number of fibrils, in stripe;

l is the length of scratch, in millimeters.

$$f_s = \bar{a} \times E_s \quad \dots\dots\dots (2)$$

where

f_s is the filiform corrosion coefficient;

\bar{a} is the average length of fibrils, in millimeters.

5.4.17 Humidity resistance

Humidity resistance test shall be in accordance with GB/T 1740, the test temperature is $47\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$. For class I and class II powder coating, test time is 1 000 h, and for class III powder coating, test time is 4 000 h.

5.4.18 Weathering resistance

5.4.18.1 Accelerated weathering resistance

Xenon-arc exposure test shall be carried out as specified in circle A of method 1 of GB/T 1865—2009. Measure the gloss retention ratio in accordance with GB/T 9754, and the color change of the test before and after the test in accordance with GB/T 11186.2 and GB/T 11186.3.

5.4.18.2 Natural exposure resistance

This test shall be in accordance with GB/T 9276. Measure the gloss retention ratio in accordance with GB/T 9754, and the color change of the test before and after the test in accordance with GB/T 11186.2 and GB/T 11186.3.

NOTE Many countries choose Florida atmospheric corrosion test station for natural exposure resistance. In the stations for atmospheric corrosion test in China, Atmospheric conditions and Florida is closer to the atmospheric corrosion test station in Qionghai, Hainan Province, but there are some differences between the test results in the atmospheric corrosion test station in Qionghai, Hainan Province and Florida.

5.4.19 Others

The tests of other properties shall in accordance with GB/T 8013.3 or shall be agreed by the supplier and the purchaser.

5.5 Appearance

The appearance test shall be in accordance with GB/T 9761 and carried out under the diffuse sunshine (3 h after sunrise and 3 h before sunset). If the test is carried out under artificial light with standard light source D65, the illumination shall be stronger than 1 000 lx. The background shall be matt black or grey and colorful background is forbidden. The observation distance is 3 m with 90° determination angle.

6 Conformity with standards

6.1 Inspection and acceptance

6.1.1 The profiles shall be inspected by the supplier, ensuring the product quality in accordance with the specification of this part or the order (or contract), and filling in the product quality assurance certificate.

6.1.2 The purchaser may re-check the received products according to this part. If the re-check result is not in accordance with the specification of this part or order (or contract), purchaser may inform supplier in written form, and the problem may be solved through consultation by both sides. The disapproval of the appearance quality and tolerance on dimensions shall be informed within 1 month after products are received. The disapproval of other properties may be informed within 6 months after products are received. If arbitration is required, the arbitration specimens will be supplied by purchaser and the arbitration will be preceded between supplier and purchaser.

6.2 Batch

The profiles shall be inspected for acceptance in batches, and each batch shall be consisted of profiles with the same alloy, temper, dimension, colour (or colour code), coating appearance type, coating performance grade, types of coating and composition of mass fraction and the same surface pretreatment processes. There is no limit for batch weight.

6.3 Inspection classification

Product inspection includes delivery inspection and routine inspection.

6.4 Inspection item and process assurance items

6.4.1 Delivery inspection item, routine inspection item and process assurance item are specified in

Table 8.

Table 8—Inspection items and process assurance

items inspection item		delivery inspection item	routine inspection item	process assurance item
chemical composition		✓	—	—
mechanical properties		✓	—	—
dimension tolerance		✓	—	—
coating thickness		✓	—	—
gloss		✓	—	—
colour differences		✓	—	—
indentation hardness		✓	—	—
adhesion		✓	—	—
boiling water resistance		✓	—	—
impact resistance		✓	—	—
cupping resistance		^a	✓	✓
bend resistance		^a	✓	✓
abrasion resistance		^a	✓	✓
hydrochloric acid resistance		✓	—	—
mortar resistance		✓	—	—
solvent resistance		^a	✓	✓
detergent resistance		^a	✓	✓
salt-spray corrosion resistance		^a	✓	✓
filiform corrosion resistance		^a	✓	✓
humidity resistance		^a	✓	✓
weathering resistance	accelerated weathering resistance	^a	✓	✓
	natural exposure resistance	^a	—	✓
others		^a	—	—
appearance quality		✓	—	—
NOTE “✓” show must be checked, or process assurance item; “—” show is not checked, or is not process assurance item.				
^a When the Inspection is indicated in the order (or contract), this item is listed as a must to be checked.				

6.4.2 Routine inspection shall be carried out at least once every three years by the supplier.

6.5 Sampling

Sampling shall be in accordance with Table 9.

Table 9—Sampling

inspection items		specifications of sampling	subclauses of requirement	subclauses of test method
chemical composition		Accord to GB/T 5237.1	4.3	5.1
mechanical property		Accord to GB/T 5237.1	4.4	5.2
dimension tolerance		Piece by piece	4.5	5.3
coating thickness		Sampling as specified in Table 10	4.6.1	5.4.1
gloss		Take 2 pieces from every batch,after the coating cured and stored 24 h,get a specimen from each piece	4.6.2	5.4.2
colour differences		Piece by piece	4.6.3	5.4.3
indentation hardness			4.6.4	5.4.4
adhesion	dry adhesion	Take 2 pieces from every batch for each inspection item,after the coating cured and stored 24 h,get a specimen from each piece	4.6.5	5.4.5
	wet adhesion			
	boiling water adhesion			
boiling water resistance		Take 2 pieces from every batch,after the coating cured and stored 24 h,get a specimen from each piece	4.6.6	5.4.6
impact resistance		Making 2 standard test panels	4.6.7	5.4.7
cupping resistance		Making 2 standard test panels for each inspection item	4.6.8	5.4.8
bend resistance			4.6.9	5.4.9
abrasion resistance			4.6.10	5.4.10
hydrochloric acid resistance		Take 2 pieces from every batch for each inspection item,after the coating cured and stored 24 h,get a specimen from each piece	4.6.11	5.4.11
mortar resistance			4.6.12	5.4.12
solvent resistance			4.6.13	5.4.13
detergent resistance			4.6.14	5.4.14
salt-spray corrosion resistance			4.6.15	5.4.15
filiform corrosion resistance			4.6.16	5.4.16
humidity resistance			4.6.17	5.4.17
weathering resistance	accelerated weathering resistance			4.6.18.1
	natural exposure resistance	Take 3 pieces in every batch,and one specimen of one piece. With the agreement of customer, the supplier can make 3 test panels instead of the profile samples which with the same thickness class, color, surface treatment method and technology.The effective surface size (length×width) of the sample (or test plate) is suitable for 250 mm×150 mm	4.6.18.2	5.4.18.2

Table 9 (continued)

inspection items	specifications of sampling	subclauses of requirement	subclauses of test method
others	According to GB/T 8013.3 or other sampling specifications agreed by the customer and supplier	4.6.19	5.4.19
appearance	Piece by piece	4.7	5.5

Table 10—Coating thickness sampling quantity and upper limit for failed quantity In piece

batch quantity	randomly sampling quantity	upper limit for failed quantity
1—10	all	0
11—200	10	1
201—300	15	1
301—500	20	2
501—800	30	3
Over 800	40	4

6.6 Rejection and retest

6.6.1 When any specimen fails in terms of chemical composition and the casting batch can be distinguished, the casting batch represented by the specimen is unqualified, the other casting batch should be checked piece by piece, and only the qualified ones shall be delivered. The whole batch fails when the casting batch cannot be distinguished.

6.6.2 When any specimen fails in terms of mechanical property, specimens in double quantity shall be taken from the same batch and be tested again. If the retest result is qualified, then the whole batch is qualified. If any specimen fails in the second test, then the whole batch fails. The supplier is allowed to check piece by piece if it is agreed by the supplier and the purchaser, and deliver the qualified ones.

6.6.3 The whole batch is failed when the specimen fails in terms of dimension tolerance. But it allows to test piece by piece, and deliver the qualified ones.

6.6.4 When the failed quantity is beyond the upper limit in terms of coating thickness according to Table 10, specimens shall be taken from the same batch in double quantity and be tested again. The whole batch qualified when in terms of the failed quantity of duplicate test don't beyond double quantity of the upper limit in Table 10, otherwise, the batch is not qualified. The supplier is allowed to check piece by piece if it is agreed by the supplier and the purchaser, and deliver the qualified ones.

6.6.5 The batch is unqualified when any specimen failed in gloss.

- 6.6.6 The piece is unqualified when any specimen failed in colour difference.
- 6.6.7 The batch is unqualified when any specimen failed in indentation hardness.
- 6.6.8 The batch is unqualified when any specimen failed in adhesion.
- 6.6.9 The batch is unqualified when any specimen failed in boiling water resistance.
- 6.6.10 The batch is unqualified when any specimen failed in impacts resistance.
- 6.6.11 The batch is unqualified when any specimen failed in cupping resistance.
- 6.6.12 The batch is unqualified when any specimen failed in bend resistance.
- 6.6.13 The batch is unqualified when any specimen failed in abrasion resistance.
- 6.6.14 The batch is unqualified when any specimen failed in hydrochloric acid resistance.
- 6.6.15 The batch is unqualified when any specimen failed in mortar resistance.
- 6.6.16 The test result of solvent resistance is only for reference but not used to show the quality of coating is weather qualified.
- 6.6.17 The batch is unqualified when any specimen failed in detergent resistance.
- 6.6.18 The batch is unqualified when any specimen failed in salt spray corrosion resistance.
- 6.6.19 The batch is unqualified when any specimen failed in filiform corrosion resistance.
- 6.6.20 The batch is unqualified when any specimen failed in humidity resistance.
- 6.6.21 The batch is unqualified when any specimen failed in weathering resistance.
- 6.6.22 The batch is unqualified when any specimen failed in other coating performance.
- 6.6.23 The piece is unqualified when any specimen failed in appearance.
- 6.6.24 When the routine inspection result is unqualified, the supplier shall re-evaluate the Mill finish profiles quality, the powder coating, process and others, and re-check it until it is qualified.

7 Marking, packing, transporting, storing, and quality certificate

7.1 Marking

7.1.1 Product marking

The qualified profiles shall be marked with the following content (or labeled with the following contents):

- a) name and address of supplier;
- b) product name;
- c) inspection stamp of supplier's quality control department (or signature or seal of quality inspection personnel);
- d) alloy, temper, dimension specification (or section code);
- e) coating class, coating code, colour (or colour code);
- f) batch number or production date;
- g) the standard number of this part;
- h) production license number and the QS mark.

7.1.2 Package box marking

The package box marking of profiles shall meet the requirements given in GB/T 3199.

7.2 Packing

Protect the exposed surfaces of profiles shall be packed by paper, foam, etc. the other packing shall be in accordance with GB/T 3199.

7.3 Transporting and storing

The transporting and storing of profiles shall be in accordance with GB/T 3199. The protective action of the transporting and the use process shall be in accordance with GB/T 5237.2.

7.4 Quality Certificate

Every batch of profiles shall be attached with product quality certificate, with the following content:

- a) supplier name;
- b) product name;
- c) alloy, temper, dimension specification (or section code);
- d) coating class, Coating code, colour (or colour code);
- e) batch number and production date;
- f) weight or pieces;
- g) test results and inspection stamp of the supplier's quality control department;
- h) the standard number of this part;
- i) production license number.

8 Order(or contract) content

Order the profiles of this part that the order (or contract) content should include the following content:

- a) supplier name;
- b) product name;
- c) alloy, temper, dimension specification (or section code);
- d) dimensionstolerances, accuracy class;
- e) coating class, coating code, colour (or colour code);
- f) weight or pieces;
- g) special requirements for purchaser:

—the specificrequirement of coating thickness;

- the testing requirement of cupping resistance;
- the testing requirement of bend resistance;
- the testing requirement of abrasion resistance;
- the testing requirement of solvent resistance;
- the testing requirement of detergent resistance;
- the testing requirement of salt spray corrosion resistance;
- the testing requirement of filiform corrosion resistance;
- the testing requirement of Heat and (constant climate condensation water test or humidity resistance);
- the testing requirement of accelerated weathering resistance;
- the specific requirement of natural exposure resistance test;
- the specific requirement of other coating properties;
- otherspecial requirement;

h) the standard number of this part.

Annex A

(informative)

Quality assurance

A.1 Process assurance

Technical process has a great effect on coating properties. To ensure the coating quality, technical process shall be carried out according to YS/T 714. The chromate-free conversion coating shall be in accordance with YS/T 1189, and it shall be carried out according to YS/T 1189.

A.2 Quality assurance of raw materials

A.2.1 The quality of mill finish profile should be in accordance with GB/T 5237.1.

A.2.2 Chromate-free chemical pretreatment reagent shall be in accordance with YS/T 1378.

A.2.3 The coating types, compositions, properties and requirements of powder coating are specified in Table A.1. For other requirements for powder coating, see YS/T 680—2016.

Table A.1—Type, composition, properties and requirements of powder coating

powder coating types	main components	properties and requirements of powder coating
pure polyester and poly urethane	resins	<p>The acid value of resin in polyester powder coating material or the hydroxyl value of resin in the polyurethane powder coating material determine the dosage of curing hardener in powder coating material. Viscosity and reaction activity of resin is the main factor affecting surface flow leveling, the glass transition temperature affects the storage stability of powder coating material. The acid value or the hydroxyl value, viscosity, glass transition temperature and colour reflect the physical and chemical characters of batch stability of resin.</p> <p>Polyol of resin synthesis is generally based on neopentyl glycol, other polyols containing no beta hydroxyl can be used also. Attention shall be paid to the purity of polyols. Neopentyl glycol shall be produced by hydrogenation method, and it is not allowed to use ethylene glycol, diethylene glycol, propylene glycol.</p> <p>The enhancement of mass fraction between the isophthalic acid (or other dicarboxylic acid with better weathering resistance) and terephthalic acid in the resin will improve the weathering resistance of powder.</p> <p>In order to ensure weathering-resistance of powder coating, isophthalic acid (or other dicarboxylic acid with better weathering resistance) mass fraction in the resin shall be greater than 15%, but it is encouraged, in the premise of improving weathering resistance, use innovation formulation and process system.</p>

Table A.1 (continued)

powder coating types	main components	properties and requirements of powder coating
pure polyester and poly urethane	resins	In order to ensure the coating weathering resistance and other performances, the sum mass fraction of the binder in the powder coating formula shall be not less than 60%. Powder coating manufacturers shall use the resins which have been proved with quality of long-term stability in real case, and resin manufacturer shall provide test report of UV weathering test report and natural exposure weathering report. Under the premise of ensuring performance requirements and the quality, the low temperature curing resin can be used also
	hardeners	Curing hardeners for polyester powder including HAA and TGIC. HAA system is comparably environment friendly, and HAA system powder coating has good storage stability, but during coating stoving, coating will release small amount of water molecules, easy to get small pinholes; TGIC system coating is not easy to get pinhole, but human skin contact TGIC will get irritant response. The curing hardeners for polyurethane powder coating are divided into the external blocked aliphatic isophorone diisocyanate and self-blocked isocyanate. The coating has good weathering resistance and chemical resistance, it has a good ink penetration in the application of the wood grain transfer profiles. In the process of coating stoving, the external blocked aliphatic isophorone diisocyanate will release the sealant of caprolactam
	pigments	Pigments are divided into organic pigments and inorganic pigments, organic pigments is worse in weathering resistance than inorganic pigments, in outdoor powder coating formulation, organic pigments shall be evaluated before use. Titanium dioxide shall be rutile type
	fills	Use precipitated barium sulfate or natural barium sulfate as filler, not allowed the incorporation of calcium carbonate, zinc oxide, talc powder
	aid additives	Additives include flow aid agent, texture agent, antioxidant, ultraviolet absorbent, degassing agent, brightening agent, hardening enhancing agent, anti scratch agent, the use of additives shall not affect the properties of the coating and spraying process
fluorocarbon	resin	Fluorocarbon powder coating resin is divided into polyvinylidene fluoride (PVDF for short, and the fluorine atom content is 59.3%) and chlorotrifluoroethylene-vinyl ether (FEVE for short, and the fluorine atom content is 27%—29%), PVDF fluorocarbon resin coating need to add 30% acrylic resin or so, coating baking temperature is high. Fluorocarbon resins powder coating is better than polyester resin powder coating in weathering resistance performance, but is worse than polyester resin powder coating in adhesion. Fluorocarbon powder coating have high requirement in pretreatment, coating thickness shall be controlled normally less than 80 μm
	hardeners	FEVE type fluorocarbon coating is thermosetting powder coating, curing hardener shall be external blocked aliphatic isophorone diisocyanate or self-blocked isocyanate. External blocked aliphatic isophorone diisocyanate caprolactam will release the sealant of caprolactam in the process of baking; PVDF fluorocarbon coating is thermoplastic powder coating, it is not necessary to use the curing hardener

Table A.1 (continued)

powder coating types	main components	properties and requirements of powder coating
fluorocarbon	pigments	Pigments are divided into organic and inorganic pigments, and the fluorocarbon powder coating are not allowed to use organic pigments. Titanium dioxide shall be rutile type
	fillers	Use precipitated barium sulfate or natural barium sulfate as filler, not allowed to allow the incorporation of calcium carbonate, zinc oxide, talc powder
	aid additives	Additives include flow aid agent, texture agent, antioxidant, ultraviolet absorbent, de-gassing agent, brightening agent, hardening agent, anti scratch agent, the use of additives shall not affect the properties of the coating and spraying process

A.2.4 Select the corresponding powder coating for 1 years, 3 years, 5 years, 10 years of natural weathering quality grade, as specified in the YS/T 680—2016.

A.2.5 To ensure the performances of the coating, wrought aluminum alloy extruded profile factory shall select suitable powder coating with proper appearance, in accordance with the requirements of Table A.2.

Table A.2—Powder coating surface appearance and corresponding control requirement of powder coating

appearance		requirement for powder coating polyesters
smooth effects	low gloss	Hydroxyl value of carboxyl polyester shall be controlled in less than 6 mg/g KOH, and deviation of polyester acid value shall be controlled in ± 2 mg/g KOH;
	semi-gloss	Acid value of hydroxyl polyester shall be controlled in less than 6 mg/g KOH, and deviation of polyester hydroxyl value shall be controlled in ± 3 mg/g KOH;
	high gloss	Viscosity value deviation of both hydroxyl and carboxyl polyester shall be controlled in less than 10% (measured by cone plate viscometer); Polyester glass transition temperature is usually controlled 52 °C—70 °C; Polyester number average molecular weight in 2 000—8 000; To achieve low gloss effect, two-component matting resin is preferred
texture effects	sand texture	Hydroxyl value of carboxyl polyester shall be controlled in less than 6 mg/g KOH, and deviation of polyester acid value shall be controlled in ± 2 mg/g KOH; Acid value of hydroxyl polyester shall be controlled in less than 6 mg/g KOH, and deviation of polyester hydroxyl value shall be controlled in ± 3 mg/g KOH; Viscosity value deviation of both hydroxyl and carboxyl polyester shall be controlled in less than 10% (measured by cone plate viscometer); Polyester glass transition temperature is usually controlled 52 °C—70 °C; Polyester number average molecular weight in 2 000—8 000; High viscosity and short gel time polyester is preferred, the weathering resistance and mechanical properties shall be consistent with smooth effect powder coating resins

Table A.2 (continued)

appearance		requirement for powder coating polyesters
texture effects	hammer tone, wrinkle,marble effect ,stereo colour carving	Select polyester with proper gel time,viscosity and glass transition temperature, according different surface requirement
special effects	wood grain effect	Hydroxyl value of carboxyl polyester shall be controlled in less than 6 mg/g KOH, and deviation of polyester acid value shall be controlled in ± 2 mg/g KOH; Acid value of hydroxyl polyester shall be controlled in less than 6 mg/g KOH, and deviation of polyester hydroxyl value shall be controlled in ± 3 mg/g KOH; Viscosity value deviation of both hydroxyl and carboxyl polyester shall be controlled in less than 10% (measured by cone plate viscometer); Polyester glass transition temperature is usually controlled 52 ℃—70 ℃ ; Polyester number average molecular weight in 2 000—8 000; Sublimation use polyester shall be selected with high cross-linking density,weath- ering resistance performance and mechanical properties of the polyester shall be consistent with smooth effect polyester. Weathering resistance and mechanical properties of rework spraying sublimation polyester shall be consistent with smooth effect polyester
	metallic effects	Polyester properties shall be consistent with smooth effect polyester. Dry blending metallic powder coating is easy to get metallic particles and resin separation,and the cured coating surface is easy to get uneven distribution of me- tallic particles,resulting in Impact resistance.Bonding metallic powder coating is preferred

A.2.6 The limitations of hazardous substances in powder coating shall be as specified in YS/T 680—2016 and Table A.3.

Table A.3—The limitations of hazardous substances in powder coating

hazardous substance	mass fraction/%
polybrominated biphenyls (PBB)	≤ 0.1
polybrominated diphenyl ethers (PBDE)	≤ 0.1
dioctyl phthalate (DEHP)	≤ 0.1
butyl benzyl phthalate (BBP)	≤ 0.1
dibutyl phthalate (DBP)	≤ 0.1
diisobutyl phthalate (DIBP)	≤ 0.1

A.2.7 Powder coating supplier should provide material safety data sheet (MSDS).

A.3 Quality certification of powder coating

To ensure the quality reliability of powder coating, aluminum profile manufacturers shall discuss the contents of quality certification with powder coating supplier. The quality certifications should cover the following items at least:

- a) the application processes, including stoving temperature and stoving time;
- b) the density of powder coating;
- c) curing hardener system;
- d) pigment types in powder coating;
- e) the class of powder coating weathering resistance, the acetic acid salt spray corrosion test results, (reverse) impact resistance test results of the test panel which chromium-free chemical-pretreated (except pre-anodized);
- f) the content of resin in powder coating, acid value (or hydroxyl value), viscosity, gel time (reaction activity), glass transition temperature, molecular weight distribution, colour;
- g) natural exposure test results of powder coating (in accordance with the formula composition, including Impact resistance value, gloss value);
- h) resin manufacturer name, batch number and type of resin and natural exposure field test results (including color difference, gloss retention);
- i) black, white standard panels prepared in accordance with the standard formula, QUV and high pressure water immersion test report;
- j) standard formula of prepared black, white standard panels.

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