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Silicone Artificial Leather Industry Standard

- Standard name: QB/T 5954-2023
- Published on: 2023-12-20
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- International Standard Classification Number: 59.080.40

1. Scope

This standard stipulates the specifications, appearance, physical and chemical properties and other requirements of silicone artificial leather, describes the specimens and corresponding test methods, and stipulates the inspection rules, marking, packaging, transportation and storage contents. This standard applies to the production, inspection and sale of silicone artificial leather made of knitted cloth base, woven cloth base and non-woven cloth base, coated with silicone materials and post-finished.

2. Normative References

The contents of the following documents constitute essential clauses of this document through normative references in the text. For references with dates, only the versions corresponding to the dates apply to this document; for references without dates, the Latest versions (including all amendments) apply to this document.

GB/T 2828.1-2012 Sampling procedures for inspection by attributes Part 1: Sampling plan for batch inspection based on acceptance quality Limit (AQL)



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GB/T 2912.1-2009 Determination of formaldehyde in textiles Part 1: Free and hydrolyzed formaldehyde (water extraction method)

GB/T 2918-2018 Standard environment for conditioning and testing of plastic specimens

GB/T 7573 Determination of pH value of aqueous extracts of textiles

GB 8410 Combustion characteristics of automotive interior materials

GB/T 8949-2008 Polyurethane dry process artificial Leather

GB/T 19942-2019 Chemical tests on Leather and fur Determination of banned azo dyes

GB/T 20385.1 Determination of organotin compounds in textiles Part 1: Derivatization gas chromatography-mass spectrometry

GB/T 22048-2022 Determination of certain phthalate plasticizers in toys and children's products

GB/T 22807 Chemical tests on Leather and fur Determination of hexavalent chromium content: spectrophotometric method

GB/T 22930.1 Chemical determination of metal content in Leather and fur Part 1: Extractable metals

GB/T 28189-2011 Textiles Determination of polycyclic aromatic hydrocarbons

GB/T 31126 Determination of perfluoro octane sulfonyl compounds and perfluoro carboxylic acids in textiles

GB/T 3443-2017 Terminology of artificial Leather and synthetic Leather

GB/T 38465-2020 Test methods for artificial Leather and synthetic Leather. Determination of cold resistance

GB/T 38612-2020 Test methods for artificial Leather and synthetic Leather Determination of tensile Load and elongation at break

HG/T 5081 Textile dyeing and finishing auxiliaries, silicone finishing agents Determination of silicone content

QB/T 2537-2001 Leather Color fastness test Reciprocating friction color fastness



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QB/T 2714-2018 Physical and mechanical tests of Leather Determination of folding fastness QB/T 2726-2005 Physical and mechanical tests of Leather Determination of wear resistance QB/T 4043-2010 Polyvinyl chloride artificial Leather for automobiles

QB/T 4671-2014 Test methods for artificial Leather and synthetic Leather Determination of hydrolysis resistance

QB/T 4672-2014 Test methods for artificial Leather and synthetic Leather Determination of yellowing resistance

QB/T 4873-2015 Test methods for artificial Leather and synthetic Leather Laboratory Light source exposure method

QB/T 5068-2017 Test methods for artificial Leather and synthetic Leather Determination of fogging QB/T 5158-2017 Test methods for artificial Leather and synthetic Leather Determination of dimethylformamide content

QB/T 5159 Test methods for artificial Leather and synthetic Leather Determination of N-methyl pyrrolidone content.

QB/T 5354 Test methods for artificial Leather and synthetic Leather - Determination of volatile organic compounds

QB/T 5447-2017 Test methods for artificial Leather and synthetic Leather - Determination of odor

QB/T 5754-2022 Water-based/solvent-free polyurethane composite artificial Leather.

3. Terms And Definitions

The terms and definitions defined in GB/T 34443-2017 and the following terms and definitions apply to this document.

3.1 Silicone Artificial Leather

A composite material made by using silicone as the main coating material to form a film Layer on a substrate through coating and post-finishing processes.

4. Classification

The silicone content of the product coating shall be tested according to the provisions of HG/T 5081 and classified according to Table 1.

Table 1 Product Classification

Class	Silicon content of coating /%
Class A	>25
Class B	≤25

Products are divided into ordinary type and flame retardant type according to their flame retardancy.

5. Requirements

5.1 Specifications

Product thickness and Limit deviation

Determined by the supplier and the buyer, the Limit deviation is ±0.1 mm.

Product width

Determined by the supplier and the buyer, the allowable positive deviation is 30 mm, and no negative deviation is allowed.

The number of sections per roll and the minimum section Length shall comply with the provisions of Table 2.

Table 2 Number Of Segments Per Roll And Minimum Segment Length

Length/(m/roll)	segments / roll	Minimum segment Length /m
<30	<2	≥6

30~40	≤ 3	≥ 6
>40	≤ 4	≥ 6

Length and deviation

There should be no negative deviation.

5.2 Appearance

Should comply with the requirements of Table 3.

Table 3 Appearance

No.	Project	Requirements
1	Pattern	Clear texture
2	Chromatic Aberration	Not obvious
3	Delamination, bubbles	Cannot exist
4	Continuity defects (wrinkles, color Lines, wear marks, scratches)	Cannot exist

5.3 Physical And Chemical Properties

It should comply with the requirements of Table 4.

Table 4 Physical And Chemical Properties

No	Properties	Requirements
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			Class A	Class B	
1	Tensile Load N	Warp (Longitudinal)	≥25		
		Weft (horizontal)			
2	Elongation break Rate /%	Warp (Longitudinal)	≥30		
		Weft (horizontal)			
3	Tearing Load N	Warp (Longitudinal)	≥20		
		Weft (horizontal)			
4	Strip Load /N	Warp (Longitudinal)	≥20		
		Weft (horizontal)			
5	Folding fastness	Normal temperature	Warp (Longitudinal)	No cracks on the surface	
			Weft (horizontal)		
		Low temperature	Warp (Longitudinal)	No cracks on the surface	
			Weft (horizontal)		
6	Color fastness to rubbing / Level	Dry Friction	≥4		
		Wet friction			
		Alka sweat friction			
7	Wear resistance /Level	≥3			
8	Fogging /mg	≤3	≤5		
9	odor /Level	≤3			



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10	Heat and humidity aging resistance	No cracking, no chalking, no fading	
11	Cold resistance -40 °C	No obvious changes on the surface	
12	Heat resistance 200-250 °C	No obvious changes on the surface	
13	Yellowing resistance /Level	≥3	
14	Light aging resistance	No obvious changes on the surface	



5.4 Flame retardant properties

Flame retardant products should comply with the requirements of GB 8410.

5.5 Limits on prohibited and restricted substances

It should comply with the requirements of Table 5.

Table 5 Limits On Prohibited And Restricted Substances

No	Project		Requirements
1	pH		4.0~8.5
2	Extractable heavy metals / (mg/kg)	Hexavalent Chromium (Cr ⁶⁺)	≤0.2
		Cadmium (C d)	≤0.1
		Mercury (H g)	≤0.02
		Stibium (Sb)	≤1
		Lead (Pb)	≤0.2
		Arsenic (As)	≤0.36
		Nickel (Ni)	≤0.2
		Cobalt (C o)	≤0.2

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		Copper (C u)	≤0.2
3		Dimethylformamide /(mg/kg)	Should not be detected
4		Formaldehyde /(mg/kg)	≤20
5		N- Methyl pyrrolidone /(mg/kg)	Should not be detected
6	Volatile organic compounds / (mg/m ³)	Formaldehyde	≤0.2
		Acetaldehyde	≤0.2
		Acrolein	≤0.2
		Benzene	≤0.2
		Toluene	≤0.2
		Xylene	≤0.2
		Ethylbenzene	≤0.2
		Phenylethanes	≤0.2
7		Decomposable aromatic amine dyes(mg/kg)	Should not be detected
8	Phthalate plasticizers /%	Butylene phthalate (DBP)	≤0.1
		Butyl benzyl phthalate (BBP)	



		Di(2-ethylhexyl) phthalate (DEHP)	
		Di-n-octyl phthalate(DNOP)	
		Diisononyl phthalate (DINP)	
		Disobey phthalate (DIDP)	
9	Polycyclic Aromatic Hydrocarbons (PAHs) ⁷ (mg/kg)		Should not be detected
10	Perfluorooctane sulfonic acid (PFOS) ¹ (mg/kg)		Should not be detected
11	Perfluorooctanoic acid (PFOA) ¹ (mg/kg)		Should not be detected
12	Organotin compounds ¹ (mg/kg)	Tributyltin	Should not be detected
		Dibutyltin	
		Nonoutlying	
a. For the List of decomposable aromatic amines, see Table 1 in GB/T19942-2019.			
b. For the List of polycyclic aromatic hydrocarbons (PAHs), see Table A.1 in GB/T 28189-2011.			

6. Test Methods

6.1 Sample Cutting

The sample should be cut at a distance of more than 0.5m from the seam of the fabric base. The sample for factory inspection should be cut at 0.5m, and the sample for type inspection should be cut at 2.0m. Before cutting the sample, 0.1m should be removed

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from both sides of the width direction before preparing the sample. When multiple samples are required for the same test item, they should be cut evenly in the horizontal direction. See Table 6 for sample size and quantity.

Table 6 Sample Size And Quantity

No	Project		Samples size	Quantity/pcs
1	Tensile strength/Break elongation rate	Warp (horizontal)	Dumbbell shape	3
		Weft (vertical)		3
2	Tearing Load	Warp (horizontal)	L 50×W 25	3
		Weft (vertical)		3
3	Strip Load	Warp (horizontal)	L 100×W 30	3
		Weft (vertical)		3
4	Folding fastness	Warp (horizontal)	L 70×W 45	4
		Weft (vertical)		4
5	Color fastness to rubbing		L 220×W 25	8

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6	Wear resistance		Φ106	3
7	Fogging		Φ80	3
8	Odor		L 200×W 100	2
9	Heat and humidity aging resistance		L 220×W 150	4
10	Cold resistance		L 60×W 20	12
11	Heat resistance		L 60×W 100	2
12	Yellowing resistance		L 62×W 12	3
13	Light aging resistance		W 22.5	4
14	Flame retardant properties	Warp (horizontal)	L356×W 100	5

6.2 Sample Condition Adjustment And Test Environment

Unless otherwise specified, the specimens shall be conditioned in the standard environment 23±5°C at level 2 specified in GB/T 2918-2018 for a period of not less than 24 hours.

6.3 Specification

- **Thickness and limit deviation:** Follow the test according to the requirements of 5.4 of GB/T 8949-2008.
- **W degrees:** Follow the test according to the requirements of 5.3 of GB/T 8949-2008.



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- **L degrees:** Follow the test according to the requirements of 5.5 of GB/T 8949-2008.

6.4 Surface

Inspect visually under natural light.

6.5 Tensile Load And Elongation Break Rate L

Follow the test in accordance with the provisions of Method C in GB/T 38612-2020.

6.6 Tearing Load

Follow the Test according to the provisions of 5.8 of GB/T 8949-2008.

6.7 Strip load

Follow the Test according to 5.7 of QB/T 5754-2022 ◦

6.8 Folding fastness

Follow the test in accordance with the provisions of QB/T2714-2018.

The folding condition at room temperature is 100,000 times at $(23\pm 2)^{\circ}\text{C}$, and the folding condition at low temperature is 30,000 times at $(-20\pm 2)^{\circ}\text{C}$. After the test, use a 6x magnifying glass to observe whether there are cracks on the surface and inside of the folded part.

6.9 Color Fastness To Rubbing

Follow the QB/T2537-2001 provisions, The test conditions shall comply with the provisions of Table 7.

Table 7 Test Conditions For Color Fastness To Rubbing

Project	Conditions
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	Abrasive Type	Weight bearing /g	Friction times
Dry Friction	White wool felt	1000	500
Wet friction			500
Alkaline sweat friction			500

6.10 Wear Resistance

Follow the test according to the provisions of QB/T 2726-2005, with a load of (1000±20) g, a CS-10 grinding wheel, and a rotation speed of 1000 rpm.

6.11 Fogging

Follow the test according to the provisions of Method B in QB/T 5068-2017

6.12 Odor

Follow the test according to the requirements of Condition 2 in QB/T 5447-2017.

6.13 Heat And Humidity Aging Resistance

Follow the test according to the provisions of Method A in QB/T4671-2014, and the wet heat treatment time was 1680 h.

6.14 Cold Resistance

Follow the test according to the provisions of Method A in GB/T 38465-2020, and the test temperature was -30°C

6.15 Heat Resistance

Follow the test in accordance with the provisions of 6.24 of QB/T 4043-2010.

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6.16 Yellowing Resistance

Follow the test according to the provisions of Method B in QB/T 4672-2014

6.17 Light Aging Resistance

Follow the test according to the A2 exposure cycle conditions specified in Method A of QB/T4873-2015. The irradiation intensity was $(0.55 \pm 0.02) \text{ W}/(\text{m}^2 \cdot \text{nm})$ @340nm, the filter was made of quartz glass (inside)/borosilicate glass (outside), and the total irradiation was $488 \text{ kJ}/\text{m}^2$

6.18 Flame Retardant Properties

Follow the test according to the provisions of GB 8410.

6.19 Limits On Prohibited And Restricted Substances

- **pH:** Follow the test according to the provisions of GB/T 7573-2009
- **Extractable Heavy Metals:** Hexavalent chromium is tested according to the provisions of GB/T 22807. Other extractable heavy metals shall be tested in accordance with the provisions of GB/T 22930.1.
- **Dimethylformamide:** Follow the test according to the provisions of Method A in QB/T 5158-2017.
- **Formaldehyde:** Follow the test according to the provisions of GB/T2912.1.
- **N-Methyl Pyrrolidone:** Follow the test according to the provisions of QB/T 5159.
- **Volatile Organic Compounds (VOC):** Follow the test in accordance with the provisions of QB/T 5354-2018.
- **Decomposable Aromatic Amine Dyes:** Follow the test in accordance with the provisions of GB/T 19942-2019.
- **Phthalate Plasticizers:** Follow the test in accordance with the provisions of Method A in GB/T 22048-2022.



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- **Polycyclic Aromatic Hydrocarbons (PAHs):** Follow the test in accordance with the provisions of GB/T 28189-2011.
 - **Perfluorooctane Sulfonate (PFOS) Compounds And Perfluorooctanoic Acid (PFOA):** Follow the test in accordance with the provisions of GB/T 31126.
 - **Organotin Compounds:** Follow the test in accordance with the provisions of GB/T 20385.1.

7. Inspection Rules

7.1 Group Batch

Products are inspected and accepted in batches. Products of the same specifications produced with the same raw materials, the same formula, the same process, and the same fabric base are considered as one batch, and the quantity of each batch shall not exceed 10,000m.

7.2 Factory Inspection

The factory inspection items include all items in 5.1 and 5.2 and items 1 to 4 in Table 4.

7.3 Type Inspection

Type inspection is all items in Chapter 5. Type inspection should be carried out in any of the following situations.

- Trial production appraisal when the product production line is changed;
- After formal production, if there are major changes in structure, materials and processes, which may affect product performance;
- Every twelve months of normal production;
- When the product is stopped for six months or more and then resumed;
- When there is a significant difference between the factory inspection results and the last type inspection results.



7.4 Sampling

Sampling of specifications and appearance: Adopt the general inspection level I specified in GB/T 2828.1-2012, the normal inspection single sampling plan, the acceptance quality limit (AQL) is 6.5, see Table 8.

Table 8 Sampling

Batch/N	Sampling/n	Received/Ac	Rejections/Re
2~ 15	2	0	1
16~ 25	3	0	
26~ 90	5		2
91~ 150	8		2
151~ 280	13	2	3
281~ 500	20	3	4

Sampling of physical and chemical properties, flame retardant properties and the limits of prohibited and restricted substances

One roll is randomly selected from each batch for inspection. If any unqualified item is found, double the number of samples should be taken from the original batch and the unqualified item should be re-inspected.

7.5 Decision rules

Determination of qualified items



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If the specifications and appearance meet the requirements of 5.1 and 5.2, the specifications and appearance are considered qualified; otherwise, the specifications and appearance are considered unqualified.

If the physical and chemical properties, flame retardant properties and the limits of prohibited and restricted substances meet the requirements of 5.3 to 5.5, the physical and chemical properties, flame retardant properties and the limits of prohibited and restricted substances are considered qualified. If there are unqualified items, double the number of samples should be taken from the original batch and the unqualified items should be retested. If all the retest results are qualified, the item is considered qualified, otherwise it is considered unqualified.

Determination of qualified batches: If all items are qualified, the batch of products is considered qualified. Otherwise, the batch of products is considered unqualified.

8 Marking, Packaging, Transportation And Storage.

8.1 Marking

Each roll of product packaging should have the following markings:

- Manufacturer name and address;
- Document number;
- Product name;
- Product category;
- Product specifications;
- Product appearance information (color, pattern);
- Production batch number, production date and storage period;
- Certificate of conformity and inspector code;
- Anti-pressure, moisture-proof and other markings.

8.2 Package

Determined through negotiation between the supply and demand parties.

8.3 Transportation

The product should be handled with care during transportation, should not be pressed heavily, should not be exposed to the sun or rain, should not come into contact with easily contaminated or corrosive chemicals, and the packaging should be kept intact.

8.4 Storage

The product should be placed flat on a shelf or pallet in a well-ventilated warehouse, and should be protected from moisture, mildew, and extrusion, and away from heat sources, coloring substances, and chemicals that are prone to pollution. The storage period of the product shall not exceed 36 months from the date of production.

About ZSR

ZSR offers customized silicone leather services, including customization of silicone leather base fabric layer, color, texture, application, size, logo, printing, pattern, brand, packaging, and technical support related silicone products. These silicone leather are suitable for industries such as baby products, marine, furniture, automotive, medical and healthcare, sports, 3C electronics, interior decoration, industrial manufacturing, and vegan fashion.

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