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CAS

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汽车玻璃窗膜技术规范

Technical Criterions for Automotive Window Film

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前　言

中国标准化协会（CAS）是组织开展国内、国际标准化活动的全国性社会团体。制定中国标准化协会标准（以下简称：中国标协标准），满足企业需要，推动企业标准化工作，这也是中国标准化协会的工作内容之一。中国境内的团体和个人，均可提出制、修订中国标协标准的建议并参与有关工作。

中国标协标准按《中国标准化协会标准管理办法》进行管理，按CAS 1.1—2001《中国标准化协会标准结构及编写规则》的规定编制。

中国标协标准草案经向社会公开征求意见，并得到参加审定会议的75%以上的专家、成员的投票赞同，方可作为中国标协标准予以发布。

使用中国标准化协会标准的单位，应按现行国家有关规定办理标准备案，并对技术内容负责。

本标准首次制定。

在本标准实施过程中，如发现需要修改或补充之处，请将意见和有关资料寄给中国标准化协会，以便修订时参考。

汽车玻璃窗膜技术规范

1 范围

本规范规定了汽车玻璃窗膜的主要技术要求和试验方法、汽车玻璃窗贴膜工艺技术条件、质量要求、标志、包装和贮存。

本规范适用于汽车玻璃窗膜，也适用于汽车玻璃窗贴膜工艺和质量要求。

2 规范性引用文件

下列文件中的条款通过本标准的引用而成为本标准的条款。凡是注日期的引用文件，其随后所有的修改单（不包括勘误的内容）或修订版均不适用于本标准，然后，鼓励根据本标准达成协议的各方研究是否可使用这些文件的最新版本。凡是不注日期的引用文件，其最新版本适用于本标准。

GB/T 2680　建筑玻璃可见光透射比、太阳光直接透射比、太阳能总透射比、紫外线透射比及有关窗玻璃参数的测定

GB/T 5137.1　汽车安全玻璃力学性能试验方法

GB/T 5137.2　汽车安全玻璃光学性能试验方法

GB/T 5137.3　汽车安全玻璃耐辐照、高温、潮湿、燃烧和耐模拟气候试验方法

GB 8410　汽车内饰材料的燃烧特性

GB 9656　汽车用安全玻璃

GB 10633　钢卷尺

GB/T 11942　彩色建筑材料色度测量方法

GB/T 17339　汽车安全玻璃耐化学浸蚀性和耐温度变化性试验方法

JC/T 632　汽车安全玻璃术语

JC/T 846　贴膜玻璃

ASTM D 1044　透明塑料表面耐磨损性试验方法

3 产品分类

汽车玻璃窗膜产品按功能分为两大类：

a) 前风窗玻璃贴膜；

b) 前风窗以外玻璃贴膜。

4 技术要求

4.1 外观质量

汽车玻璃窗膜的外观质量须符合表 1 的规定。

表 1　外观质量

缺陷名称	规格	质量要求
针孔	—	不允许出现
斑点	1.0mm≤直径<2.0mm	中部：不允许 不限
	直径≥2.0mm	不允许
膜层划伤	0.1mm≤宽度≤0.3mm 长度≤60mm	不限 划伤距离≥100mm
	宽度>0.3mm	不允许
脱胶	—	不允许
注：　玻璃贴膜的“中部”是指距玻璃贴膜边缘 75mm 以内的区域，其它部分为边部。		

4.2 光学性能

汽车玻璃窗膜的光学性能包括：可见光透射比、可见光反射比、紫外线透射比、光畸变、副像偏离、总太阳能透过率，其参数应符合表 2 规定。

表 2　光学性能指标

项目	前风窗玻璃贴膜后	前风窗以外玻璃贴膜后
可见光透射比（380nm～780 nm）% ≥	70	报告
可见光反射比（380nm～780 nm）% ≤	12	报告
紫外线透射比　% ≤	5	1
光畸变 ≤	2	—
副像偏离 ≤	15	—
太阳能总透过率　%	标签明示指标	

4.3 颜色均匀性

前风档玻璃窗膜的颜色均匀性色差应不大于 2.5CIELAB，前风档以外玻璃窗膜应不大于 3.0CIELAB。

4.4 颜色识别应符合 GB 9656 的要求。

4.5 抗磨性

试样试验前后的雾度差值应不大于 4%。

4.6 耐辐照性

汽车玻璃窗膜的耐辐照性见表 3。

表 3　耐辐照性能指标

项目	前风档玻璃窗膜	前风档以外玻璃窗膜
紫外线照射后的状态	1. y/X 100%～95% 2. y≥70%	试验前后可见光的透射比差值的绝对值不应大于 3%，
注：1. x 为紫外线照射前的透射比；y 为紫外线照射后的透射比。 2. 用白色背景检查时，试样不可有显著变化（变色、出泡、浑浊等）。		

4.7 耐温度变化性能

试样试验后应能满足 GB 9656 标准中 5.14 规定，不得出现任何皱折，发雾、脱胶或其它显著的缺陷。

4.8 耐化学浸蚀性

试样试验后应能满足 GB 9656 标准中 5.16 规定，没有任何软化、胶粘、龟裂或明显失透，试验前后可见光的透射比差值的绝对值应不大于 4%。

4.9 耐燃烧性

试样燃烧速率应能满足 GB 9656 标准中 5.15 规定，不超过 100mm/min。

4.10 耐湿性

试样试验后应能满足 GB 9656 标准中 5.9 规定。

4.11 耐热性

试样试验后应能满足 GB 9656 标准中 5.7 规定。

4.12 抗穿透性

试样试验后应能满足 GB 9656 标准中 5.11 规定，膜片不得断裂，不得因玻璃剥落而暴露。

4.13 人头模型冲击性（沿贴膜一侧冲击）

使用人头模型从贴膜车窗玻璃膜片一侧撞击后，应能满足 GB 9656 标准中 5.10 规定，贴膜玻璃必须破碎，无大碎片玻璃，并可轻易取下。

4.14 抗冲击性

玻璃贴膜后应仍能满足 GB 9656 标准中 5.12 规定，膜片不得断裂，不得因玻璃剥落而暴露。

4.15 碎片状态

玻璃贴膜后应仍能满足 GB 9656 标准中 5.13 规定。

5　试验方法

5.1 试验条件

除特殊规定外，试验应在下述条件下进行：

5.1.1 温度：20℃±5℃

5.1.2 气压：8.60×104～1.06×105 Pa

5.1.3 相对湿度：40%～80%

5.1.4 试样

a）膜片：检验膜片应从制品（玻璃窗膜）上相应区域切取；

b）贴膜玻璃：按 JC/T864，从制品（玻璃窗膜）上相应区域切取，贴在相应的汽车窗玻璃上,养护完毕后作为试样。

5.2 外观质量

以膜片为试样。在良好的自然光及散射光照条件下，在距试样正面约 600mm 处进行目视检查。

5.3 可见光透射比的测定

以贴膜玻璃为试样。按 GB/T 5137.2 进行。

5.4 可见光反射比

以贴膜玻璃为试样。按 GB/T 5137.2 进行。

5.5 紫外线穿透比

以贴膜玻璃为试样。按 GB/T 2680 进行。

5.6 光畸变

以贴膜玻璃为试样。按 GB/T 5137.2 进行。

5.7 副像偏离

以贴膜玻璃为试样。按 GB/T 5137.2 进行。

5.8 太阳能总透过率

试验方法参照 GB/T 2680，试件为玻璃贴膜。

5.9 颜色识别的测定

以贴膜玻璃为试样。按 GB/T 5137.2 进行。

5.10 颜色均匀性试验

以贴膜玻璃为试样。颜色均匀性的测量按 GB/T 11942 进行。

5.11 抗磨性的测定

以玻璃贴膜为试样。按 ASTM D 1044 进行。

5.12 耐辐照性的测定

以玻璃贴膜为试样。按 GB/T 5137.3 进行。

5.13 耐温度变化的测定

以贴膜玻璃为试样。试验方法按 GB/T 17339-1998 《汽车安全玻璃耐化学蚀性和耐温度变化性》。

5.14 耐化学浸蚀性

以贴膜玻璃为试样。试验方法按 GB/T17339-1998 《汽车安全玻璃耐化学蚀性和耐温度变化性》。

5.15 耐燃烧性

以贴膜玻璃为试样。试验方法按 GB 8410 规定方法进行。

5.16 耐湿性

以贴膜玻璃为试样。试验方法按 GB/T 5137.3 规定方法进行。

5.17 抗穿透性的测定

以贴膜玻璃为试样。试验方法按 GB/T 5137.1 规定方法进行。

5.18 人头模型冲击（沿贴膜一侧冲击）的测定

以贴膜玻璃为试样。试验方法按 GB/T 5137.1 规定方法进行。

5.19 抗冲击性

以贴膜玻璃为试样。试验方法执行 GB 9656 的 7.12 规定按 GB/T 5137.1 方法进行。

5.20 碎片状态

以贴膜玻璃为试样。试验方法执行 GB 9656 的 7.13 规定按 GB/T 5137.1 方法进行。

6 贮存、施工环境、产品标注

6.1 产品贮存

汽车玻璃窗膜应保存在室内，温度为 5-24℃的通风干燥处。

6.2 施工环境和施工人员资质

汽车贴膜应在室内进行，贴膜工应持证上岗。所持证件必须由生产厂家或法定代理人发给。

6.3 汽车玻璃贴膜施工的质量要求

表 4　施工质量要求

项目	质量要求	试验方法
外表面	平整、无气泡、无开裂 无褶皱	目测
膜内	无疵点和杂物	目测
间隙（下摇式车窗顶部）	不易发现	目测
视觉重影、水痕	不易发现	目测

6.4 产品标注

6.4.1 按照国际惯例，汽车膜应有产品标注，如 ES35 或者**35。其中 35 表示透光率 35%。

6.4.2 包装标志应包括产品名称、产地、厂名、厂址（包括网址）、商标、规格、数量、生产日期、批号、执行如 CAS 标准等。

6.4.3 进口产品和非进口产品说明

进口产品及分装产品应有中文说明，标明原产地（即生产厂国家代码，而不是所属公司的国家代码）。此外，必须能提供完整、真实和详细的报关证明。

非进口产品必须标明“中国制造”（既 made in China）的字样。

本标准起草工作组构成：

主要起草单位：中国建材装备有限公司
首诺国际贸易（上海）有限公司
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Foreword

China Association for Standardization (CAS) is a nationwide public organization that organizes and carries out activities about domestic and international standardization. Developing CAS Standard to meet the needs of enterprises and promote the work of enterprise standardization is one of CAS' work contents. Both groups and individuals at home can offer the suggestion on developing or revising CAS standard, and participate in the relevant work.

CAS standard is managed according to "Management Rules for the Standards of CAS", and developed on the basis of CAS 1.1—2001 "Rules for the structure and drafting of standards of CAS ".

The draft of CAS Standard is open to the society for suggestion. Only with the vote of more than 75 percent experts and members who attend the Meeting can the draft be issued as the CAS Standard.

Organizations adopting CAS Standard should apply the registration of standard in accordance with the current national relevant rule and are in charge of the technical content..

This standard is established for the first time.

In the process of implementing the standard, please mail the opinion and relevant materials to CAS if you find something to be revised or complemented.

Technical Criterions for Automotive Window Film

1 Scope

This Standard specifies the technical requirements and testing methods for automotive window film, technical conditions and quality requirements for automotive window filming process, marking, packaging and storage.

This Standard applies to automotive window film; it also applies to process and quality requirements for automotive window filming.

2 Normative Referenced Documents

The following standards contain provisions that, through reference in this text, constitute provisions of this standard. For dated reference, subsequent amendments to, or revisions of, any of these publications do not apply (excluding corrections), and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. For undated references, the latest edition of the normative document referred to applies.

GB/T 2680 Determination of light transmittance, solar direct transmittance, total solar energy transmittance and ultraviolet transmittance for glass in building and related glazing factors

GB/T 5137.1 Road vehicles--Safety glazing materials--Part 1:Test methods for mechanical properties

GB/T 5137.2 Road vehicles--Safety glazing materials--Part 2:Test methods for optical properties

GB/T 5137.3 Road vehicles--Safety glazing materials--Part 3:Test methods for resistance to radiation, high temperature, humidity, fire and simulated weathering

GB 8410 Flammability of automotive interior materials

GB 9656 Safety glazing materials for road vehicles

GB 10633 Steel Tape

GB/T 11942 Colorimetric methods for colour building materials

GB/T 17339 Road vehicles--Safety glazing materials--Test methods for resistant-to-chemicals and resistant-to-temperature changes

JC/T 632 Road vehicles-safety glazing materials-terminology

JC/T 846 Film mounting glass

ASTM D 1044 Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion

3 Product Category

Automotive window film products are divided into two major categories by their functions:

a) Front windshield film

b) Other glass film other than that for front windshield

4 Technical Requirements

4.1 Appearance Quality

The appearance quality of automotive window film shall confirm with the requirements of Table 1.

Table 1 Appearance Quality

Defect	Specification	Quality requirement
Pinhole		Not allowed to appear
Blemish	1.0mm≤diameter<2.5mm	Middle: Not allowed Not specified
	Diameter ≥2.0mm	Not allowed
Film scratch	0.1mm≤width≤0.3mm Length ≤60mm	Not specifed Distance between scratches ≥ 100mm
	Width >0.3mm	Not allowed
De-gumming		Not allowed
Remarks: "Middle" of glass film means the inner area 75mm from the edges of the glass film areas are margins.		

4.2 Optical Property

The optical performance of automotive window film includes: visual light transmittance, visual light reflectance, ultraviolet transmittance, optical distortion, ghost deviation, total solar energy transmittance.

The parameters shall comply with the regulations of Table 2.

Table 2 Optical Performance Indexes

Item	After filming of front windshield	After filming of other glass other than front windshield
Visible light transmittance (380nm～780nm)% ≥	70	Report
Visible light reflectance (380nm～780 nm) % ≤	12	Report
Ultraviolet transmittance % ≤	5	1
Optical distortion ≤	2	—
Ghost deviation ≤	15	—
Total transmittance of solar energy %	Label indicated index	

4.3 Color Uniformity

The chromatic aberration for the color uniformity of front windshield film shall not exceed 2.5CIELAB; it shall not exceed 3.0CIELAB for other window film.

4.4 Color identification shall confirm to the requirements of GB 9656.

4.5 Abrasion Resistance

The difference of haze of the test sample shall not exceed 4% before and after the test.

4.6 Irradiation Resistance

See Table 3 for the irradiation resistance of automotive window film.

Table3 Irradiation Resistance Performance Indexes

Item	Front windshield film	Window film other than front windshield film
After ultraviolet irradiation	1. y/X 100%～95% 2. y≥70%	The absolute value of the difference of visible light transmittance before and after the test shall not exceed 3%.
Remarks: 1. x is the transmittance before violet irradiation; y is the transmittance after violet irradiation. 2. When inspected against white background, the test sample shall not have any obvious transformation (color change, bubbles, turbidness, etc.)		

4.7 Resistance to Temperature Variations

The test sample shall comply with the regulations in 5.14 of GB 9656 after the test; there shall be no wrinkles, fogginess, de-gumming or other obvious defects.

4.8 Resistance to Chemical Etching

The test sample shall comply with the regulations in 5.16 of GB 9656 after the test; there shall be no any softening, stickiness, crazing or obvious loss of transmittance. The absolute value of the difference of visible light transmittance before and after the test shall not exceed 3%.

4.9 Combustion Resistance

The combustion velocity of the test sample shall comply with the regulations in 5.15 of GB 9656 and no greater than 100mm/min.

4.10 Moisture Resistance

The test sample shall comply with the regulations in 5.9 of GB 9656 after the test.

4.11 Heat Resistance

The test sample shall comply with the regulations in 5.7 of GB 9656 after the test.

4.12 Penetration Resistance

The test sample shall comply with the regulations in 5.11 of GB 9656 after the test; the film shall not break or expose when the glass breaks.

4.13 Headform Impact (impact from the filmed side)

After the impact of headform from the filmed side of the filmed window glass, the regulations in 5.10 of GB 9655 Standard shall be complied with. The filmed glass must break without leaving large broken pieces and can be easily taken off.

4.14 Impact resistance

The filmed glass shall comply with the regulations in 5.12 of GB 9656; the film shall not break or expose when the glass breaks.

4.15 Conditions of Broken Pieces

The filmed glass shall comply with the regulations in 5.13 of GB 9656.

5 Testing Method

5.1 Testing Conditions

Unless otherwise specified, the tests shall be conducted under the following conditions:

5.1.1 Temperature: 20℃±5℃

5.1.2 Atmospheric pressure: 8.60×10^4 Pa～1.06×10^5 Pa

5.1.3 Relative moisture: 40%～80%

5.1.4 Test sample

a) Film: The test film shall be cut from appropriate area of product (window film)

b) Filmed glass: cut from appropriate area of product (window film) according to JC/T864; adhere to appropriate automotive window glass; use as test sample after curing.

5.2 Outer Appearance

The test sample is a film. Inspect the test sample visually approximately 600mm from the front side of the sample under natural and diffused light.

5.3 Test of Visual Light Transmittance

The test sample is filmed glass; conduct the test in accordance with GB/T 5137.2.

5.4 Visual Light Reflectance

The test sample is filmed glass; conduct the test in accordance with GB/T 5137.2.

5.5 Ultraviolet Transmittance

The test sample is filmed glass; conduct the test in accordance with GB/T 2680.

5.6 Optical Distortion

The test sample is filmed glass; conduct the test in accordance with GB/T 5137.2.

5.7 Ghost Deviation

The test sample is filmed glass; conduct the test in accordance with GB/T 5137.2.

5.8 Total Transmittance of Solar Energy

Refer the testing method to GB/T 2680; the test sample is filmed glass.

5.9 Test of Color Identification

The test sample is filmed glass; conduct the test in accordance with GB/T 5137.2.

5.10 Color Uniformity Test

The test sample is filmed glass; the test of color uniformity is conducted in accordance with GB/T 11942.

5.11 Test of Abrasion Resistance

The test sample is filmed glass; conduct the test in accordance with ASTM D 1044.

5.12 Test of Irradiation Resistance

The test sample is filmed glass; conduct the test in accordance with GB/T 5137.3.

5.13 Test of Resistance to Temperature Variation

The test sample is filmed glass; the testing method is in line with GB/T 17339-1998 *Testing Methods for Resistance of Automotive Safety Glass to Chemical Etching and Temperature Variety.*

5.14 Resistance to Chemical Etching

The test sample is filmed glass; the testing method is in line with GB/T 17339-1998 *Testing Methods for Resistance of Automotive Safety Glass to Chemical Etching and Temperature Variety.*

5.15 Combustion Resistance

The test sample is filmed glass; the testing method is in line with the specified method in GB 8410.

5.16 Moisture Resistance

The test sample is filmed glass; the testing method is in line with the specified method in GB/T 5137.3.

5.17 Test of Penetration Resistance

The test sample is filmed glass; the testing method is in line with the specified method in GB/T 5137.1.

5.18 Test of Headform Impact (impact from the filmed side)

The test sample is filmed glass; the testing method is in line with the specified method in GB/T 5137.1.

5.19 Impact Resistance

The test sample is filmed glass; the testing method is in line with the specified method in GB/T 5137.1 as prescribed in 7.12 of GB 9656.

5.20 Conditions of Broken Pieces

The test sample is filmed glass; the testing method is in line with the specified method in GB/T 5137.1 as prescribed in 7.13 of GB 9656.

6 Storage, Operation Environment and Product Marking

6.1 Product Storage

The automotive window film shall be stored at a well-ventilated and dry indoor place where the temperature is 5℃~24℃.

6.2 Operation Environment and Qualification for Operators

The automotive filming shall be conducted indoors and the filming workers shall hold the employee's certificates for work; the employee's certificates must be issued by the manufacturer or its legal agent.

7.4 Quality Requirements for Filming Operation of Automotive Windows

Item	Quality requirement	Inspection method
Outer surface	Flat; free of bubbles, cracks or wrinkles	Visual inspection
In the film	No blemish or foreign substance	Visual inspection
Gap (top of roll-down window)	Indistinct	Visual inspection
Visual ghost effect, drop marks	Indistinct	Visual inspection

7.5 Product Marking

7.5.1 According to international practices, the automotive film shall have product markings such as ES35 or **35, of which, 35 indicates that the luminous transmittance is 35%.

7.5.2 The package markings shall include the denomination, place of origin, manufacturer, plant location (including website), trademark, specification, quantity, production date, lot number, applicable standards of the product such as CAS, etc.

7.5.3 Description of Imported Product or Non-imported Product

The complete or sub-packaged imported products shall be marked with their place of origin (i.e. the country code of the manufacturing plant instead of the country code of the parent company). Besides, complete, authentic and detailed customs clearance certificate shall be furnished.

The non-imported products must be marked with the letters of "Made in China".

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