

ICS 31.030
CCS L 90



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 29848-2018

Replacing GB/T 29848-2013

**Ethylene-vinyl acetate copolymer (EVA) film for photovoltaic
modules**

光伏组件封装用乙烯-醋酸乙烯酯共聚物(EVA)胶膜

Issued on: December 28, 2018

Implemented on: April 1, 2019

**Issued by: State Administration for Market Regulation;
Standardization Administration of China**

Table of Contents

1	Scope
2	Normative references
3	Terms and definitions
5.5	Determination of physical performance
5.5.1	Luminous transmittance
5.5.5	EVA/glass peel strength
5.5.9	Tracking resistance index
5.5.9.1	Preparation of specimen Take uncured EVA film.Follow the requirements of
5.5.10	UV-aging resistance
5.5.11	High-temperature high-humidity aging performance
5.5.14	PCT aging performance (optional item)
7	Packaging, marking, transportation, storage
7.1	Packaging
7.4	Storage

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard replaces GB/T 29848-2013 "Ethylene-vinyl acetate copolymer (EVA) film for PV module".As compared with GB/T 29848-2013, the main technical changes are as follows: - MODIFY the scope of application (see clause 1; clause 1 of the 2013 version); - MODIFY the normative reference (see clause 2; clause 2 of the 2013 version); - ADD the terms and definitions of transparent EVA film, white EVA film, surface density.DELETE the terms and definitions of EVA film, crosslinking degree, shrinkage rate (see clause 3; clause 3 of the 2013 version); - MODIFY the specification requirements, which is divided into transparent EVA specifications, white EVA specifications.ADD the deviation of surface density (see clause 4.1; clause

4.1 of the 2013 version); - ADD the requirements of "no folding mark, no stain" in the appearance requirements (see clause 4.2; clause

4.2 of the 2013 version); - ADD the physical performance requirements of transparent EVA.CHANGE the "indicators" in Table 2 of the 2013 version into the "transparent EVA indicators".DELETE the requirements for vinyl acetate content.MODIFY the transmittance, peel strength, volume resistivity, UV-aging resistance, high-temperature and high-humidity aging performance.CHANGE the breakdown voltage strength into electrical strength.ADD

the tensile strength, elongation at break, tracking resistance index, dry-heat aging performance (optional), UV high-temperature high-humidity aging performance (optional), PCT aging performance (optional), (see clause 4.3; clause

4.3 of the 2013 version); - CHANGE the "requirements for specimen" into "test conditions".MODIFY the relevant requirements (see clause 5.2; clause

5.2 of the 2013 version); - MODIFY the test method of thickness.ADD the test method of the deviation of the surface density (see clause 5.3; clause

5.3 of the 2013 version); - ADD the visual inspection method (see clause 5.4; clause

5.4 of the 2013 version); - ADD the test method of the deviation of surface density (see clause 5.3.2); Ethylene-vinyl acetate copolymer (EVA) film for PV module

1 Scope

China's national standard for the ethylene-vinyl acetate copolymer film used to encapsulate photovoltaic modules. It specifies the requirements, the test methods, the inspection rules and the packaging, marking, transport and storage of EVA encapsulant film. EVA film is the material the solar cells live in. A module is a sandwich: glass, a layer of film, the cells and their interconnects, another layer of film, and the backsheet. The whole assembly is laminated under heat and vacuum, and during that lamination the film melts, flows around the cells and the ribbons, fills every void, and then crosslinks into a rubbery solid that holds the sandwich together for the next twenty-five years. It has to be optically clear so that the light reaches the cells, it has to adhere to glass on one side and to the backsheet on the other, it has to stay flexible through daily thermal cycling, and it must not yellow, must not delaminate, and must not release anything that corrodes the cell metallisation. Encapsulant failure is one of the principal ageing mechanisms of modules in the field: browning reduces the output, delamination admits moisture, and acetic acid released by hydrolysis of the vinyl acetate corrodes the interconnects. The 2018 revision reflects a market that has separated into two products. It divides the specification into transparent EVA and white EVA - the latter used behind the cells to reflect light that passed between them back into the module - with separate requirements for each, adds a surface density specification with its deviation, adds appearance requirements for folding marks and stains, and adds physical performance requirements for the transparent grade. Issued on 28 December 2018 and in force since 1 April 2019, it replaces GB/T 29848-2013.

This standard specifies the terms and definitions, requirements, test methods, inspection rules, packaging, marking, transportation and storage of ethylene- vinyl acetate copolymer (EVA) film for photovoltaic module (hereinafter referred to as EVA film). This standard is applicable to EVA film for surface crystalline silicon photovoltaic module.The film module may make reference to this standard.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 1033.1-2008 Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method liquid pycnometer method and titration method

GB/T 1040.1-2006 Plastics - Determination of tensile properties - Part 1: General principles

GB/T 1040.3-2006 Plastics - Determination of tensile properties - Part 3: Test Conditions for films and sheets

GB/T 1408.1-2016 Electrical strength of insulating materials - Test methods - Part 1: Tests at power frequencies

GB/T 1410-2006 Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials

GB/T 2410-2008 Determination of the luminous transmittance and haze of transparent plastics

GB/T 2790-1995 Adhesives, 180° peel strength test method for a flexible-bonded-to-rigid test specimen assembly

GB/T 2828.1-2012 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 2918-1998 Plastics - Standard atmospheres for conditioning and testing

GB/T 4207-2012 Method for the determination of the proof and the comparative tracking indices of solid insulating materials

GB/T 6672-2001 Plastics film and sheeting - Determination of thickness by mechanical scanning

IEC 61215-2:2016 Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures
ASTM E313-2010 Standard practice for calculating yellowness and whiteness indices from instrumentally measured color coordinates
ASTM E424-71 (2015) Standard test methods for solar energy transmittance and reflectance (terrestrial) of sheet materials

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Transparent EVA film A film which uses the EVA resin as the main raw material, is added with various additives, is formed by melt processing, has transparent appearance, is used for terrestrial PV assembly.

3.2 White EVA film A film which uses the EVA resin as the main raw material, is added with white fillers and various additives, is formed by melt processing, has white appearance, is used for terrestrial PV assembly.

3.3 Surface density The EVA film mass per unit area. According to the determination method of GB/T 1033.1-2008, determine the density of the EVA film. Determine at least 3 groups for each specimen. Take the average value.

5.4 Appearance The appearance of EVA film shall, under the illumination of not less than 1000 lx, be subjected to visual inspection. It requires the observer to have normal vision or corrected visual acuity of

0.8 or above. Lay the EVA film flatly on a static workbench. The distance from the observer's eye to the observed specimen does not exceed

0.6 m, to make observation at an angle of 45° to the workbench. Check whether the film is flat, free of creases, stains, visible impurities, or bubbles, has clear embossing.

5.5.1 Luminous transmittance

5.5.1.1 Instrumentation Spectrophotometer: It is equipped with an integrating sphere, the diameter of which shall be greater than 90 mm.

5.5.1.2 Preparation of specimen Take a piece of EVA film which has a size of 50 mm x 50 mm. From top down, sequentially superimpose the front-panel material, the non-adhesive film, the EVA film, the non-adhesive film, the back-panel material. Place it into the vacuum laminating machine, allowing the front-panel to face downwards. According to the curing temperature and time as required for the product, carry out curing and crosslinking. Then take it out. Place it into a desiccator to cool it to room temperature. Prepare for use. For the specimen as taken from the non-adhesive film, the upper and lower surfaces shall be flat; the thickness shall be uniform; the crosslinking degree reaches above 75%. The number of specimens for each group is not less than 3.

Note 1: The front-panel material and the back-panel material shall be consistent with the materials used in the actual PV modules.

Note 2: The non-adhesive film does not react with EVA film during the lamination process. It can withstand temperatures above 200 °C. It may use the surface-untreated ETFE film; the thickness of which ranges 50 µm ~ 125 µm.

5.5.1.3 Test method Test the specimen according to the spectrophotometer method of GB/T 2410- 2008. Set the wavelength range of the spectrophotometer to be 290 nm ~ 1100 nm. Respectively calculate the average values of the luminous transmittances W_2 - The