

## **Round Module Wrap for Seed Cotton Certification**

The US cotton industry is taking all necessary measures to eliminate plastic contamination in baled cotton. Research has proven that if round modules are delivered to cotton gins in good condition, meaning no tears, punctures, loose material, or adhesive failures then the likelihood of plastic entering the gin and ultimately the ginned bale is greatly reduced.

To ensure that plastic wrap material meets a minimum acceptable standard, the US cotton industry and USDA-ARS scientists have worked with the American Society of Agricultural and Biological Engineers (ASABE) to develop a standard for round module wrap. While this standard is voluntary, it will be promoted and strongly recommended by the US industry. The Cotton Engineering Committee within the ASABE recently updated standard S615.2, titled “Cotton Module Cover Material Performance,” to include testing requirements and performance specifications for round module wrap. The goal of this updated standard is to define minimum performance levels for round module wrap products in order to protect stored seed cotton from quantity and quality losses and minimize plastic contamination in ginned lint bales.

This guide describes the required testing and resulting minimum performance levels that a wrap product must meet or exceed to achieve compliance with ASABE S615.2. Wrap products that demonstrate compliance with ASABE S615.2 may be included on a list of “Approved Wrap Products” maintained by the National Cotton Council (<https://www.cotton.org/tech/quality/approved-rmw-products.cfm>).

A copy of ASABE S615.2 can be found at <https://www.asabe.org/Portals/0/aPubs/S615.pdf> and should be reviewed by wrap manufacturers before beginning the process to demonstrate compliance.

### **Certificates of Analysis and Approved List**

To allow companies, manufacturers, importers and/or distributors to be included on an approved list of round module wrap providers, the National Cotton Council will accept a certificate of analysis (COA) from third party certified laboratories. All charges and costs associated with testing and reporting shall be borne by such round module wrap provider.

**COA:** Providers of round module wrap shall provide a COA to users of those materials when requested by the purchaser. The NCC may request a COA from providers of approved material at any time.

**Required Information:** The following information must be recorded on a COA.

**Date:** The day(s) month and year when the round module wrap was manufactured/fabricated.

**Name and Address of Provider:** The name and physical address of the facility that manufactures or fabricates the round module wrap. The address shall consist of a street name and number (or other geographic identifier), city, state, and country of origin. For round module wrap that will be imported, the importer will be responsible for obtaining and maintaining a COA from the foreign manufacturer(s). If the manufacturer or importer is not also the distributor, the COA provided to the NCC and the purchaser shall contain the name and physical address of the distributor. The address shall consist of a street name and number (or other geographic identifier), city, and state.

## **Information to be Included in the COA**

The COA shall include pertinent information related to the testing described in the ASABE S615.2 Round Module Section of the Cotton Module Cover Material Performance Standard.

- **Tested Properties and Test Methods:** A description of the testing properties and methodologies.
- **Testing Results:** The reference shall be followed by the testing results from the test as prescribed in this section of the standard.
- **Name of Certified Testing Facility:** The name and address of the testing facility and a copy of their ISO 17025 accreditation.
- **Date Inspected:** Date of inspection(s) along with the name and telephone number of the person responsible for overseeing manufacturers/fabricators inspection.

**Round Module Wrap ASABE Certification:** Providers shall comply with the applicable manufacturing inspections and certification requirements found in the ASABE S615.2 Standard. Approved providers must secure recertification at least once every three years following initial certification. Approved providers must also re-certify within 180 days following any change that is made to the Round Module Wrap that alters its physical or field performance. The NCC reserves the right to conduct random testing intermittently during the three-year period as necessary. Any expenses for testing shall be borne by the wrap provider.

## **General Statements on Testing, Performance, and Compliance**

- 1) The results of testing to demonstrate compliance with S615.2 are valid for 3 years from the date of testing as long as no changes are made to the materials used in production of the wrap or to the design specifications for the wrap. (Section 4.7)
- 2) Wrap products should be designed so that they function properly on the harvester. The wrap portions and rolls should be designed such that they do not interfere with the operation of the machine. Further, wrap products should be designed such that they are not damaged by harvester components at any time when in storage or use on the machine. Adhesive materials used on wrap products must not be deposited anywhere on the harvester. (Section 5.2.3)
- 3) When applied to a round module, the wrap product should form a tight, well-defined shoulder to prevent damage during handling and transportation. The wrap should be able to withstand normal wear expected during field/gin handling and transportation. (Section 5.2.3)
- 4) Wrap products must contain a minimum of 4 radio frequency identification (RFID) tags that conform to ASABE S647 (Seed Cotton Module Identification System). Use of RFID tags is intended to allow for unique module identification and automated positioning of round modules based on tag position. (Section 5.2.5)

## **Laboratory Testing**

Laboratory testing of wrap material samples must be conducted by a qualified independent service provider. (Section 8.2.6)

Results of testing must be provided by the testing provider to the Repository maintained by National Cotton Council, and must include a statement of fidelity certifying that the tests were conducted according to the specified ASTM methods described in S615.2 and that they have not been altered by the wrap manufacturer.

A minimum of five (5) wrap portions should be selected for sample collection. The wraps should be taken from rolls each differing in production date/lot number. Material submitted for laboratory testing should be collected from new (unused) wrap portions that have not been subjected to tension over that required to remove it from the roll. Material samples should be prepared by cutting and hand-layering the required sections to produce the necessary film layer combination. Testing samples should be made up of the weakest multi-layer combination that exists when a wrap product is applied to a normal-size round module of 94 – 96 inches in diameter. Testing samples should not include material from areas used to join wrap portions on a roll (e.g. clean release coatings), areas of material transition (taped, glued, or welded joints), or segments used to secure the end of the wrap to the outside of the module (adhesive tails, etc.) Covers from the same rolls selected for laboratory testing should be used to cover modules used in field testing. It is recommended that manufacturers successfully complete laboratory testing prior to the beginning of field testing. Upon successful completion of laboratory testing, one hand-layered round module cover from a roll selected for laboratory testing and prepared as outlined in section 8.1.3 shall be shipped to the National Cotton Council offices at 7193 Goodlett Farms Pkwy, Cordova, TN 38088. (Sections 8.1.1 – 8.1.3)

When preparing material samples for testing, manufacturers should produce enough sample material to conduct compliance testing and retain adequate material to allow the laboratory tests to be repeated if disputed. The material should be kept in proper storage conditions by the manufacturer for a period of three years from the date of testing, after which it can be discarded. (Section 8.1.4)

The direction or orientation of the material during testing is critical for several of the methods specified. The direction parallel to the module circumference and axis should be clearly indicated on each sample (Sections 3.7 and 3.8). Conduct the following five laboratory tests on the prepared samples:

- 1) Tensile strength should be determined in both material directions (circumference and axis) according to ASTM D882 “Standard Test Method for Tensile Properties of Thin Plastic Sheeting.” Specimen width should be 1 inch (25.4 mm) and the instrument should use an initial grip separation distance of 2 inches (50 mm) and a grip separation speed of 20 in/min (500 mm/min). (Section 8.2.1)
- 2) Tear-propagation resistance should be determined in both material directions according to ASTM D1938 “Standard Test Method for Tear-Propagation Resistance (Trouser Tear) of Plastic Film and Thin Sheeting by a Single-Tear Method.” Specimen size should be 3 inches (76.2 mm) long by 1 inch (25.4 mm) wide. (Section 8.2.2)
- 3) Puncture-propagation tear resistance should be determined in both material directions according to ASTM D2582 “Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.” Specimens should be a minimum of 8 inches (203 mm) long in the direction of the tear and approximately 8 inches (203 mm)

wide. The test instrument should use a 3 lb (1.36 kg) carriage weight and a drop height of 20 inches (508 mm). (Section 8.2.3)

- 4) Resistance to impact-puncture penetration should be determined according to ASTM D3420 “Standard Test Method for Pendulum Impact Resistance of Plastic Film” using Procedure A. Specimen size should be approximately 4 inches (102 mm) diameter or 4 inches by 4 inches (102 by 102 mm) square as required to fit the test instrument aperture. (Section 8.2.4)
- 5) Thickness should be determined according to ASTM D6988 “Standard Guide for Determination of Thickness of Plastic Film Test Specimens.” (Section 8.2.5)

For each of the ASTM testing methods defined above, multiple measurements should be made on the material sampled from each wrap portion and the results averaged to represent the measured value for that “Single” wrap sample. It is suggested that a minimum of 5 observations per module wrap sample be made for each testing method, but additional observations will help improve the reliability of the sample “Single” average and reduce the effect of material variability. This multiple observation procedure is to be repeated for each of the module wrap samples submitted. To demonstrate acceptable material performance under the laboratory testing requirement of S615.2:

- The overall average of all wrap samples submitted must meet or exceed the “Group” parameter levels specified in the table below, and
- The average for each individual sample must meet or exceed the “Single” parameter levels specified in the table below.

<b>Characteristic</b>			<b>Module Circumference</b>	<b>Module Axis</b>	<b>Section</b>
<b>Tensile Strength</b>	Maximum Load	Group	151 N (34.0 lbf)	162.4 N (36.5 lbf)	8.2.1
		Single	99.6 N (22.4 lbf)	131.2 N (29.5 lbf)	
	Elongation	Group	716 %	835 %	
		Single	603 %	757 %	
<b>Tear-Propagation Resistance</b>	Maximum Load	Group	22.4 N (5.0 lbf)	25.5 N (5.7 lbf)	8.2.2
		Single	21.0 N (4.7 lbf)	23.3 N (5.2 lbf)	
<b>Puncture-propagation tear resistance</b>	Tear resistance	Group	120.0 N (27.0 lbf)	129.2 N (29.0 lbf)	8.2.3
		Single	117.8 N (26.5 lbf)	125.1 N (28.1 lbf)	
	Tear length <sup>[a]</sup>	Group	50.5 mm	47.3 mm	
		Single	51.3 mm	48.6 mm	
<b>Impact-Puncture Penetration Resistance</b>		Group	4.23 J		8.2.4
		Single	3.91 J		
<b>Thickness</b>		Group	219 $\mu$ m (8.62 mils)		8.2.5
		Single			

## **Color**

Acceptable colors for wrap products according to S615.2 include any color except clear, white, tan, brown or black. The recommended color for wrap products is similar to Pantone 306C specified by the CIELCH color model: L = 68.42, C = 40.14, H = 235.94°, delta E = 2.0. Color change measured (on the top half of the module) over the 6 month field testing period must not exceed delta E = 2.0. (Section 8.3.1)

UV inhibitors should be used in the film to prevent degradation due to solar radiation. (Section 5.2.4)

## **Field Testing**

Field testing of wrap products applied to round modules is to be conducted by the manufacturer to evaluate the performance of the wrap as a system in use. A minimum of 24 modules (94 +/- 2 inch diameter) should be harvested and wrapped on a round module building harvester and subjected to normal in-field handling and transportation practices in the process of moving the modules to the field testing location. The modules should be positioned with adhesive tail sections to receive full sun exposure with the axis of each module being parallel to Earth's lines of latitude. The storage environment should be similar to that of Lubbock, TX for wrap products to be used in colder environments while the storage environment should be similar to that of Corpus Christi, TX for wrap products to be used in more moderate temperature environments. Measurements on each module should be conducted weekly for the first two months of testing and at least monthly for the remaining 4 months. (Section 8.4.1)

Each module should be evaluated based on the following field test criteria:

- 1) Cover tail adhesive separation – Minor: a layer separation between the outer tail section containing the tail adhesive and the next inner film layer that has length [along the module axis] less than 10 inches or depth [along the module circumference] less than 2 inches. No more than 3 minor separation zones shall occur on a module cover with minor tail adhesive separation. (Section 8.4.3) No more than 10% of test modules can exhibit “cover tail adhesive separation – minor” to achieve acceptable performance under S615.2.
- 2) Cover tail adhesive separation – Major: a layer separation between the outer tail section containing the tail adhesive and the next inner film layer that has length [along the module axis] greater than 10 inches or depth [along the module circumference] greater than 2 inches; or more than 3 cover tail adhesive separation – minor zones. (Section 8.4.4) No more than 10% of test modules can exhibit “cover tail adhesive separation – major” to achieve acceptable performance under S615.2.
- 3) Breaks in cover material - any single or multi-layer material breaks, splits, or other ruptures caused by weathering or material weakening during storage. (Section 8.4.5) No more than 10% of test modules can exhibit “breaks in cover material” to achieve acceptable performance under S615.2.
- 4) Adhesive slip – any displacement in the direction of the module circumference of the cover tail section containing tail adhesive] relative to its initial position on the next film layer inside. Adhesive slip can occur with or without the occurrence of cover tail adhesive separation. (Section 8.4.6) No more than 10% of test modules can exhibit “adhesive slip” to achieve acceptable performance under S615.2.
- 5) Cover system failure – any cover that has a complete separation of the outer tail section from the module and/or exposure of seed cotton in a cylindrical module around the

module circumference along full or partial length of the module axis caused by any single or combination of factors experienced during storage. (Section 8.4.7) No modules included in field testing can exhibit “cover system failure” to achieve acceptable performance under S615.2.

- 6) Module squat ratio – module squat ratio is defined as the horizontal diameter divided by the average of the horizontal and vertical diameters of the flat face of a cylindrical module. The average ratio is to be determined for a cylindrical module from measurements taken on both flat faces. Module squat shall be measured after ejection from the harvester and again after 2 months of storage. (Section 8.4.8) A maximum squat ratio of 1.07 is required of all test modules to achieve acceptable performance under S615.2.

The field-testing results collected from the test modules on each measurement day must be provided by the manufacturer to the Repository maintained by the National Cotton Council. Photos of modules in field testing will be provided to the National Cotton Council staff on a monthly basis. A minimum of four photos should be submitted for each module. The four photos should include a view across the full width of the module showing the outer tail of the module wrap, a view of the side of the module opposite from the outer tail, and views of both flat faces of the module. A photo(s) showing the entire group of modules at the storage location should also be submitted.

Cylindrical module cover materials that meet or exceed the performance specifications given in Section 9 can be described with the statement, “The material system forming this module cover met the requirements for acceptable performance under ASABE Standard S615 for cold to moderate / moderate to warm / all intended use environments.” Either the words “cold to moderate”, “moderate to warm”, or “all” should be included based upon field testing environmental conditions (see section 8.4). This statement may be included in the product label attached to the module cover and in advertising materials. (Section 4.9)

**Approved List:** Upon receipt of satisfactory test results and a COA from the certified testing laboratory, the NCC will publish a list of approved round module wrap suppliers. The list will be maintained on the Contamination Prevention Page of the NCC website.

The third party certifying laboratory should mail the completed COA to:  
National Cotton Council  
Round Module Wrap Standard  
PO Box 2995  
Cordova, TN 38088

They may also be faxed: (901) 725- 0510