

Technical Correction to 2015 NIST Handbook 133

Issue: In 1992¹ the NCWM adopted a test procedure for verifying the declared length on packages of baler twine that is in Section 4.7. “Baler Twine – Test Procedure for Length” in NIST Handbook 133 (2015) “Checking the Net Contents of Packaged Goods.” NIST, OWM recently compared the NIST Handbook 133 test procedure to the industry standard for baler twine (refer to ANSI/ASAE S315.4 (2011) “Agricultural Baling Twine for Automatic Balers”) to ensure that the procedures were consistent. In review, we found that tension required in Section 4.7. was inconsistent with the tension requirement in the industry standard. In NIST Handbook 133, the tension requirement is 4.53 kg (10 lb) while the tension requirement in ANSI/ASAE S315.4 is 1.0 kg (2.2 lb). If the current tension requirement in NIST Handbook 133 (2015) is used the obvious result will be inaccurate, since the twine will overstretch. In researching the history of the procedure, the source of the discrepancy was in the original proposal. We contacted the source of the original proposal and confirmed that an error was made in the original tension value. It was agreed that it should have been 1.0 kg (2.2 lb); the same value as stated in the industry standard.

Corrective Action: OWM will editorially correct the tension requirement to read 1.0 kg (2.2 lb) in Section 4.7. “Baler Twine – Test Procedure” in the next edition of NIST Handbook 133 and note the change in the “2015 Editorial Changes” that will be included in the 2016 edition. OWM will also publish a correction notice on the NIST Handbook 133 website and in an upcoming newsletter to alert state directors and weights and measures officials of the correct tension to be applied when using Section 4.7. “Baler Twine – Test Procedure for Length.”

Corrected Test Procedure Shown Below

4.7. Baler Twine – Test Procedure for Length

4.7.1. Test Equipment

- A scale that meets the requirements in Section 2.2. “Measurement Standards and Test Equipment.”

NOTE: A scale with 0.1 g (0.000 2 lb) increments must be used for weighing twine samples. The recommended minimum load for weighing samples is 20 divisions.

- Steel tapes and rules – Determine measurements of length to the nearest division of the appropriate tape or rule.

➤ Metric units:

For labeled dimensions 40 cm or less, linear measure: 30 cm in length, 1.0 mm divisions; or a 1.0 m rule with 0.1 mm divisions, overall length tolerance of 0.4 mm.

For labeled dimensions greater than 40 cm, 30 m tape with 1 mm divisions.

¹ See Item 240-9 - “5.3.3. Baler Twine,” on page 155 in NIST Special Publication 845 “Report of the 77th National Conference on Weights and Measures (1992).”

➤ U.S. customary units:

For labeled dimensions 25 in or less, use a 36 in rule with $\frac{1}{64}$ in or $\frac{1}{100}$ in divisions and an overall length tolerance of $\frac{1}{64}$ in.

For dimensions greater than 25 in, use a 100 ft tape with $\frac{1}{16}$ in divisions and an overall length tolerance of 0.1 in.

- A hand-held straight-face spring scale of at least 4.53 kg (10 lb) capacity or a cordage-testing device that applies the specified tension to the twine being measured. When measuring twine samples or total roll length, apply ~~4.53~~ **1.0** kg (~~10~~ **2.20** lb) of tension to the twine.

4.7.2. Test Procedure

1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection; select a random sample.
2. Select packages for tare samples. Determine gross weights of the initial tare sample and record.
3. Open the tare samples. Use the procedures for tare determination in Section 2.3.5.1. “Determination of Tare Sample and Average Tare Weight” to compute the average tare weight and record this value.
4. Randomly select four balls of twine from the packages that were opened for tare.

From each of the four balls of twine:

- Measure and discard the first 10.05 m (33 ft) of twine from each roll. Accurate measurement requires applying tension to the ends of the twine before measuring in order to straighten the product.
 - Take two 30.48 m (100 ft) lengths of twine from inside each roll.
 - Weigh and record the weight of each piece separately and record the values. Compare the weight values to determine the variability of the samples. If the individual weights of the eight twine samples vary by more than one division on the scale, use one of the following steps: (1) if the lot is short, determine the actual length of the lightest-weight roll found in the lightest-weight package of the lot to confirm that the weight shortages reflect the shortages in the length of the rolls; or (2) determine the average weight-per-unit of measure by taking ten 30.48 m (100 ft) lengths from inside the lightest weight package. Use this value to recalculate its length and determine lot compliance.
5. Weigh all of the sample lengths together and record the total value. Determine the total length of the samples (243.8 m or 800 ft, unless more than eight sample-lengths were taken) and record the value. Compute the average weight-per-unit-of-length by dividing the total weight by the total length of the pieces.
 6. Determine the MAV for a package of twine (refer to Appendix A, Table 2-8. “Maximum Allowable Variations for Packages Labeled by Length, (Width), or Area”).

- Record the total declared package length.
 - Multiply the MAV from Appendix A, Table 2-8. “Maximum Allowable Variations for Packages Labeled by Length, (Width), or Area” times the total package length to obtain the MAV for length and record this value.
 - Multiply the weight per unit of length (from Step 4) times the MAV for the total declared package length to obtain the MAV by weight and record this value.
 - Convert the MAV to dimensionless units and record.
7. Calculate the nominal gross weight and record.

Follow Section 2.3.6. “Determine Nominal Gross Weight and Package Error” to determine individual package errors. Determine errors using the following formula:

$$\text{Package error (weight)} = (\text{package gross weight}) - (\text{nominal gross weight})$$

- To convert the package error in weight back to length, divide the weight by the average weight-per-unit-of-length.

4.7.3. Evaluation of Results

Follow the procedures in Section 2.3.7. “Evaluate for Compliance” to determine lot compliance.