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Agricultural Baling Twine for Automatic Balers



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Agricultural Baling Twine for Automatic Balers

Developed by the Engineering Policy Committee of the Farm and Industrial Equipment Institute; approved by the ASAE Power and Machinery Division Technical Committee; adopted by ASAE December 1968; revised April 1974, December 1976; reaffirmed December 1981; approved as an American National Standard December 1982; reaffirmed December 1986, December 1991; reaffirmed by ANSI September 1992; reaffirmed by ASAE December 1996, December 1998, December 1999; reaffirmed by ANSI June 2000; reaffirmed by ASAE January 2001, December 2001; revised by ASAE December 2002; revision approved by ANSI January 2003; reaffirmed February 2008; revised January 2012; reaffirmed May 2017; revised August 2018.

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1 Purpose and Scope

1.1 The purpose of this standard is to provide uniform polyolefin and sisal agricultural baler twine specifications to ensure satisfactory performance in round and square balers and have adequate durability in normal storage and handling of baled forage and biomass materials.

1.2 This standard is intended to cover agricultural baler twines manufactured for use in round balers, small square balers, and large square balers. This standard is not intended to restrict manufacturers in the use of materials or manufacturing processes, rather create a minimum expectation of baler twine product performance.

2 Definitions

For the purpose of this Standard, the following definitions apply:

2.1 agricultural baler twine: A synthetic or sisal material used in binding or tying forage and/or biomass feedstock wherein the baler twine maintains the bale integrity during baling, handling, transport, and storage.

2.2 bale (of twine): Baler twine package containing one or more balls of twine.

2.3 ball: A cross wound cylindrical unit of twine

2.4 dynamic loading: Nearly all baler twine is subject to dynamic loading to some degree. Whenever a load (bale) is picked up, moved, dropped, stacked, etc. there is an increased force due to the acceleration or dynamics of the movement.

2.5 footage: The normal measure of the twine in meter per ball or bale; feet per ball or bale.

2.6 gauge length: The length of a specimen under pre-tension measured from nip-to-nip of the jaws of the holding clamp in their starting position over which strain, change of length and other characteristics are measured.

2.7 knot strength: Mechanical or hand-tied baler twine knot measurement of a sample's resistance to longitudinal force (tension); a measure indicated by the maximum force a sample can withstand without rupture or breaking (maximum load) as expressed in Newton (N) or pound-force (lbf).

- 2.8 linear density:** Measure of mass per unit of length, and is a characteristic used for testing of baler twine. Linear density is expressed as kilogram per meter (kg/m) or pound per foot (lb/ft).
- 2.9 minimum breaking strength:** The minimum breaking strength is the force that a baler twine is required to meet or exceed in a laboratory test when it is new and unused.
- 2.10 piled twine:** Two or more individual strands of untwisted twine twisted uniformly together.
- 2.11 polyolefin:** Principle Polypropylene (PP), High Density Polyethylene (HDPE), Low Density Polyethylene (LDPE) and / or Linear Low Density Polyethylene (LLDPE).
- 2.12 tensile strength:** Measurement of a sample's resistance to longitudinal force (tension); a measure indicated by the maximum force a sample can withstand without rupture or breaking (maximum load) as expressed in Newton (N) or pound-force (lbf).
- 2.13 test lot/batch:** Quantity by number of balls or bales from which a specified number of balls or bales will be selected for testing.
- 2.14 test sample:** The specified number of tests to be carried out on a single ball / bale to determine physical characteristics of the sample.
- 2.15 wire replacement:** Term frequently used to describe synthetic 3-tie through 6-tie baler twines as those specific balers produce heavier and higher density bales.
- 2.16 working load:** The working load is the weight or force applied to the baler twine in a given application.
- 2.17 yield:** The inverse of linear density and typically expressed as meter per kilogram or feet per pound.
- ### 3 General Requirements
- 3.1** The baler twine shall contain no substances which would prove harmful to livestock when it is consumed with the feed ration if normal diligence is maintained to prevent accidental consumption. The twine shall be resistant to chemical agents (herbicides, fertilizers, hay treatments, etc.) which could prematurely deteriorate the twine and its expected usefulness.
- 3.2** In order to meet the requirements for durability in handling and storage of baled material, consideration must be given to the effects of rodents, insects, rot, and mildew.
- 3.3** The baler twine shall meet fit-for-use requirements for weather ability and Ultra-Violet (UV) protection for the intended geographic region. Fit-for-use shall mean the finished (twine wrapped or tied) bale shall maintain its integrity for a minimum of 12 months. Various methods for testing twine weather ability include, but not limited to ASTM standards D4329 and G154 (florescent lamp which apply UV, heat, and moisture to twine) and D2565 and G155 (xenon arc which uses UV and moisture — Atlas Materials Testing Solutions/Outdoor Weathering Services).
- 3.4** The baler twine shall be uniform in cross-section throughout its length to insure satisfactory performance in a properly adjusted baler knotter.
- 3.5** The baler twine shall be manufactured with consideration to field application, working load, and dynamic loading for which it will be subjected.
- 3.6** Each ball or bale of twine shall be continuous in runnage and contain no more knots than specified in Table 1 (below). Knots shall be of proper size and strength to function satisfactorily in a baler. Plied knots, whereas more than a single strand is combined or twisted together, are not allowed.