

INTERNATIONAL
STANDARD

ISO
5080

Second edition
1994-11-15

Sisal agricultural twines

Ficelles agricoles en sisal

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Reference number
ISO 5080:1994(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 5080 was prepared by Technical Committee ISO/TC 38, *Textiles*.

This second edition cancels and replaces the first edition (ISO 5080:1977), clause 10 of which has been technically revised.

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Sisal agricultural twines

1 Scope

This International Standard establishes the principal properties of sisal agricultural twines, prescribes methods of test permitting their verification and specifies the form of commercial presentation for the twines.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2:1973, *Textiles — Designation of the direction of twist in yarns and related products*.

ISO 1968:1973, *Ropes and cordage — Vocabulary*.

ISO 3534-1:1993, *Statistics — Vocabulary and symbols — Part 1: Probability and general statistical terms*.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 1968 and ISO 3534-1 and the following definitions apply.

3.1 agricultural twine: Monofilament twine intended for use in agriculture, notably for binding the bundles on automatic pick-up balers or the sheaves on reaping and binding machines or on similar machines.

3.2 batch: Definite quantity of twine produced under conditions which are presumed uniform.

3.3 laboratory sample: Total selection of samples from a batch intended for the laboratory for testing.

3.4 specimen: Quantity of twine on which a test in accordance with this International Standard is carried out.

4 Designation

A twine conforming to this International Standard is designated by the term "sisal agricultural twine", followed by its code number.

EXAMPLE

A sisal agricultural twine having a length of 300 m per kilogram of mass is designated as follows:

Sisal agricultural twine No. 300

5 Manufacture

The fibre used for the manufacture of the twine shall consist of new genuine fibre of long staple; it shall be unadulterated, free from defects and true to form as sisal (*Agave sisalana*).

Each spool of twine shall be capable of working with continuity throughout its length.

The twine shall have a Z twist, as defined in ISO 2.

For the purpose of dressing the fibre, a lubricant shall be added.

6 Technical properties

The technical properties of the twines and the methods to be used for their measurement are indicated in table 1, which also indicates the application of the twines.

When the indicated values are neither maxima nor minima, the tolerances indicated in table 1 apply.

7 Sampling

7.1 Number of spools in a laboratory sample

Each 100 t or part thereof in a consignment of twine of the same code number shall represent a batch for

testing, to which the following sampling formula applies:

$$S = 0,25 \sqrt{N}$$

where

S is the number of spools sampled (when S as calculated is not a whole number, round off the value obtained to give a whole number);

N is the number of spools in a batch of 100 t or less.

7.2 Selection of sample

For each batch, the laboratory sample is made up as follows.

Select at random the required number of spools, each taken from a different bale of the batch.

Table 1 — Technical properties of sisal agricultural twines

Relevant property	Units	Designation of the twine ¹⁾			Test method given in
		No. 150	No. 200	No. 300	
		Values for the properties			
Runnage	m/kg	150 ± 12	200 ± 16	300 ± 24	8.1
Equivalent linear density	tex	6 667 ⁺⁵⁷⁹ ₋₄₉₄	5 000 ⁺⁴³⁵ ₋₃₇₀	3 333 ⁺²⁹⁰ ₋₂₄₇	
Minimum breaking force	daN ²⁾	98	69	40	8.2
Minimum extractable lubricant	% (m/m)	13	13	13	8.3
Application	—	High- and medium-density baling		Low-density baling and binding	—

1) Although other sizes of twine are not recommended, any country which, for internal reasons, would have to include other twines in its national standard must record in its standard that these twines are not included in the International Standard. In order to make sure that these twines have the same quality level as that of the twines in this International Standard, their specifications shall be calculated, as far as the minimum breaking force requirement is concerned, by means of the following equation:

$$R = \frac{17\,400}{n} - 18$$

where

R is the breaking force, in decanewtons;

n is the runnage of twine, in metres per kilogram.

2) The SI unit of force is the newton. A force of 1 decanewton (daN) ≈ 1,02 kgf.

8 Test methods

8.1 Determination of linear density and runnage

8.1.1 Principle

Weighing, under specified conditions, specimens of specified length, then calculation of the linear density and the runnage (or length in metres per kilogram).

8.1.2 Apparatus

8.1.2.1 Balance, accurate to 0,5 g.

8.1.2.2 Wrap-reel, of known perimeter.

8.1.3 Specimens

8.1.3.1 Selection

Select 30 m of twine from each spool as follows.

Directly from the centre of each spool, in an anti-clockwise direction, draw the first 10 m of twine and discard them. Then draw 30 m of twine and wind them as adjacent turns (without overlapping) on the wrap-reel (8.1.2.2), exercising just sufficient tension on the twine to maintain straightness.

Remove the twine from the wrap-reel.

Each specimen of 30 m thus obtained constitutes a test piece.

8.1.3.2 Conditioning

The tests shall be carried out in an ambient atmosphere provided that the twine has been kept in conditions which do not damage its original properties.

In case of dispute, leave the specimens for 48 h in a standard atmosphere for testing [temperature $20\text{ °C} \pm 2\text{ °C}$, relative humidity $(65 \pm 2)\%$], before continuing with the tests.

8.1.4 Procedure

Determine the mass m_1 , in grams, of each specimen by weighing on the balance (8.1.2.1) to the nearest 0,5 g.

8.1.5 Expression of results

8.1.5.1 Calculation of linear density

For each specimen, calculate the linear density T , in tex, using the equation

$$T = \frac{1\,000\,m_1}{30}$$

where m_1 is the mass, in grams, of the specimen.

8.1.5.2 Calculation of runnage

Calculate the runnage L , in metres per kilogram of twine, using the following formula:

$$L = \frac{10^6}{T}$$

where T is the linear density, in tex.

8.1.5.3 Check test

If a specimen is outside the tolerance given in table 1, a check test shall be carried out on another spool.

If the result of the check test is found to be within the limits of the permitted tolerances (see table 1), the result of the check test is adopted for the value of the linear density.

8.2 Determination of breaking force

8.2.1 Principle

Measurement of the force (expressed in decanewtons) necessary to break, under known conditions, a specimen of specified length.

8.2.2 Apparatus

8.2.2.1 Tensile testing machine, having a constant rate of traverse, with a mobile grip. This testing machine should comprise:

8.2.2.1.1 Two devices for gripping the ends of the test piece.

8.2.2.1.2 Device for maintaining the rate of traverse constant at $500\text{ mm/min} \pm 50\text{ mm/min}$.

8.2.2.1.3 Device for indicating or recording continuously the force applied.

8.2.3 Specimens

After determining the runnage, draw directly from the centre of each spool in an anti-clockwise direction, and without cutting the twine, 10 specimens spaced 5 m from each other and of sufficient length so that once they are mounted in the testing machine, the free length of the specimen between the gripping devices is as close as possible to 500 mm.

Each specimen shall be identified by reference to the spool from which it has been drawn.

8.2.4 Procedure

8.2.4.1 Check that the speed of movement of the moving grips of the machine is constant and equal to 500 mm/min \pm 50 mm/min.

8.2.4.2 Before mounting the test piece between the grips, check that the axes of the latter are as close as possible to 500 mm apart.

8.2.4.3 Mount the specimen in the machine so that it coincides with the axis of pull, taking care to avoid loss of twist other than that inevitably lost in drawing out the twine.

8.2.4.4 Start the machine, apply the force continuously until the specimen breaks, and record this force, in decanewtons. If a specimen breaks in the grips, or as a result of damage caused by them, remove it and start the test again with a new specimen.

8.2.5 Expression of results

For the breaking force test, take into consideration only the results obtained when the break occurs between the grips of the testing machine.

If any one of the 10 specimens from a sample spool fails to reach the minimum breaking force specified in table 1 for the twine being tested, the result shall be rejected and another spool of twine sampled in its place.

This retest procedure is applicable to all sample spools representing a batch.

Should any test result from the retest sample spool or spools fail to reach the minimum breaking force requirement, the batch represented by the sample spools shall be deemed not to comply with this International Standard.

8.3 Determination of extractable lubricant

8.3.1 Principle

Extraction, by a suitable solvent, of lubricants contained in a specific mass of twine, then weighing of the lubricant residue after removal of the solvent and drying.

8.3.2 Apparatus

8.3.2.1 Balance, accurate to 0,05 g.

8.3.2.2 Soxhlet extraction apparatus.

8.3.2.3 Extraction cartridges for Soxhlet apparatus.

8.3.2.4 Oven, adjustable to 103 °C \pm 2 °C.

8.3.3 Specimens

8.3.3.1 Sampling

Select from each spool in the laboratory sample about 10 g of twine; the total mass thus selected shall be enclosed in a plastic bag and rolled up for despatch to the test laboratory.

8.3.3.2 Conditioning

The tests shall be carried out in an ambient atmosphere provided that the twine has been kept in conditions which do not damage its original properties.

In cases of dispute, leave the specimens for 48 h in a standard atmosphere [temperature 20 °C \pm 2 °C, relative humidity (65 \pm 2) %], before continuing with the tests.

8.3.4 Procedure

Select a representative specimen, of mass at least 40 g, from the total mass obtained in 8.3.3.1. If this specimen cannot be extracted in one operation, divide it into two and extract the two parts separately.

Weigh the specimen or specimens together to the nearest 0,05 g, place them in an extraction cartridge and insert them into the Soxhlet apparatus after calibrating the extraction flask of the apparatus.

Extract the lubricant with an appropriate solvent for approximately 4 h. Remove the excess solvent by distillation, then dry the lubricant residue in the oven, regulated at 103 °C \pm 2 °C, for 3 h. Cool to ambient temperature and weigh again.