

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 801

PULPS

DETERMINATION OF SALEABLE MASS, IN LOTS,
OF PULP BALED IN SHEET FORM

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 801, *Pulps – Determination of saleable mass, in lots, of pulp baled in sheet form*, was drawn up by Technical Committee ISO/TC 6, *Paper, board and pulps*, the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

Work on this question by the Technical Committee began in 1963 and led, in 1965, to the adoption of a Draft ISO Recommendation.

In March 1966, this Draft ISO Recommendation (No. 894) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Argentina	Iran	Spain
Australia	Israel	Sweden
Bulgaria	Italy	Switzerland
Chile	Japan	Turkey
Cuba	Korea, Rep. of	U.A.R.
Czechoslovakia	Netherlands	United Kingdom
Denmark	New Zealand	U.S.S.R.
Finland	Norway	Yugoslavia
France	Poland	
Hungary	Romania	
India	South Africa, Rep. of	

Six Member Bodies opposed the approval of the Draft.

Belgium	Mexico
Canada	Portugal
Germany	U.S.A.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in August 1968, to accept it as an ISO RECOMMENDATION.

PULPS

DETERMINATION OF SALEABLE MASS, IN LOTS, OF PULP BALED IN SHEET FORM

1. SCOPE

This ISO Recommendation describes a method for determining the dryness of a lot of pulp baled in sheet form and for calculating its saleable mass.

This method applies to all kinds of pulp baled in sheet form.

2. TERMINOLOGY

For the purposes of this ISO Recommendation, the following definitions apply:

- 2.1 *Lot*. The total number of bales of the same sort of pulp of specific characteristics.
The number of bales comprising a lot is indicated by the invoice or by agreement between the contracting parties.
A lot of bales of pulp is said to be "with specification" if it is accompanied by a certificate of origin stating for each bale either
- its gross mass and its absolute dryness,
- or
- its saleable mass.
- 2.2 *Gross mass*. The total mass of a bale, a part of a lot or a lot comprising
- contents,
 - wrappers (pulp — paper),
 - packaging wires or strappings.
- 2.3 *Oven-dry mass*. The mass obtained on drying pulp at a temperature of 103 ± 2 °C, until constant mass is reached.
- 2.4 *Absolute dryness*. The ratio of oven-dry mass of pulp to its initial mass; it is expressed as a percentage.
- 2.5 *Air-dry mass*. The mass of the pulp when its moisture content is in equilibrium with the ambient atmosphere.
- 2.6 *Commercial dryness*. Commercially a conventional equilibrium value has been accepted which is the commercial dryness.
It is 88 % or 90 % according to the country and/or commercial agreements.*

* If the air dryness is 90 %, the pulp contains ninety parts of absolutely dry fibres and ten parts of water. For an air dryness of 88 %, the corresponding figures are eighty-eight and twelve. All parts are by mass.

- 2.7 *Saleable mass*. The gross mass multiplied by the absolute dryness, divided by the commercial dryness. Usually it approximates to air-dry mass.
- 2.8 *Invoiced mass*. The saleable mass indicated by the vendor on the invoice.

3. PRINCIPLE OF THE METHOD

From the lot, a number of sample bales is taken in accordance with a sliding scale, which is a function of the total number of bales in the complete lot. These sample bales are weighed* and collected in groups of six bales.

Five specimen sheets are selected from each sample bale under defined conditions.

From each specimen sheet a test piece is cut in the form of a triangle, as indicated in section 6.

The test pieces are weighed and dried to constant mass to determine their oven-dry mass.

The saleable mass of the lot is then deduced.

4. APPARATUS

- 4.1 *Scale*, suitable for weighing the bales, the accuracy of which is at least 1/1000.
- 4.2 *Balance*, of suitable sensitivity, such that it will weigh the test pieces accurately to at least 1/5000.
- 4.3 *Equipment* for marking the position of the specimen sheets to be selected (see Annex B) and the test pieces in these sheets, as well as cutting them.
- 4.4 *Equipment*, for storing at least thirty test pieces to prevent them from gaining or losing mass before weighing.
- 4.5 *Drying oven*, with good ventilation and capable of being controlled at a temperature of 103 ± 2 °C.

5. SAMPLE BALES

All the sample bales should be representative of the lot and for this purpose, so far as possible, these bales should be selected at random from all parts of the lot. In the absence of any other agreement between the parties, the available part of the lot to be examined should not be less than half the complete lot at the time of examination.

If the bales have identification numbers relating to several series, the sample bales should be selected as far as possible in proportion to the size of each of these series.

The sample bales should be intact and as little damaged as possible.

Rejections should consist of :

- bales showing signs of definite drying or wetting, as may happen with bales situated on the external faces of a stack;
- bales or wrappings of bales having deteriorated, or showing clear signs of accidental localised wetting or loss;
- bales carrying traces of previous sampling;
- bales whose number is illegible or is not contained in the specification, if this is a lot specified bale by bale.

* The mean of the gross mass of the sample bales is considered as being the mean of the gross mass of all the bales in the lot.

The number of sample bales should be governed by the following Table :

TABLE 1 – Number of sample bales to be taken

Total number of bales in lot	Number of sample bales	
	minimum	maximum
Up to 100	12	24
101 to 200	18	36
201 to 300	24	48
301 to 400	24	48
401 to 500	24	48
501 to 600	30	60
601 to 700	30	60
701 to 800	36	72
801 to 900	36	72
901 to 1000	42	84
1001 to 2000	48	96
2001 to 3000	60	120
3001 to 4000	72	144
4001 to 5000	96	192

Above 5000 the minimum number to be taken is $100 + 1\%$ of the bales in excess of 5000, the maximum number being $200 + 1\%$ of the bales in excess of 5000. In all cases, the total number of sample bales should be a multiple of 6.

When the lot is relatively uniform, and the number of bales rejected (exclusive of bales from the outer faces of the stack) does not exceed 10% of the minimum number of bales to be selected (see Table 1), then the minimum number will be taken. Otherwise, the analyst will decide, within the limits set in the Table 1, the number of bales to be selected.

For frozen pulp, the sampling should be postponed until the bales have thawed, so that satisfactory test pieces can be cut from the sheets.

6. PROCEDURE

6.1 Weighing of sample bales

Determine the gross mass of each sample bale separately and report the results with a degree of accuracy between $1/500$ and $1/1000$; report, if possible, their marks and references in the order of their weighing. The scale should be checked before the weighings and during the course of the operation (see clause 4.1).

If the moisture content of the sheets of pulp serving as wrappers differs obviously from that of the rest of the bale, or if the wrappers are invoiced separately, they should be tested separately in the manner described in clause 9.1.

6.2 Selection of specimen sheets

Five specimen sheets should be selected from each sample bale, as described below, as soon as possible after weighing.

Five sheets are drawn from each sample bale, the distance between the sheets being constant and equal to $1/5$ of the total thickness of the bale (see clause 9.2). The sheets should not be taken from the same positions in each bale, but should be selected according to the procedure described below and illustrated in Figure 1. In sample bale No. 1 the first sheet to be taken is that at the extreme top, and the last sheet (the fifth) will be $1/5$ of the thickness of the bale from the bottom. In sample bales Nos. II, III, IV, V and VI, each sheet is taken from a slightly lower position (actually $1/50$ of the thickness of the bale) than the corresponding sheet of the preceding bale; thus in sample bale No. VI the first sheet will be taken $1/10$ of the height of the bale from the top, and the last sheet will be $1/10$ of the height of the bale from the bottom. The sample bale No. VII will recommence the cycle and be treated in the same way as the sample bale No. I, etc. In this way one outside sheet is taken from every six sample bales, the proportion thus being one outside sheet in every thirty specimen sheets taken.

All specimen sheets should be selected very carefully, especially those within about 5 cm from the top and the bottom of the bale.

The specimen sheets can be selected easily with the aid of an appropriately graduated measuring rod (see Annex B). The rod is placed in an inclined position against the side of the bale, so that its lower end is at the level of the bottom face on the bale, and the upper line at the level of its top. The faces on the rod correspond to the six bales in a bale group and the lines correspond to the five specimen sheets in the bale.

If the top and bottom of the bales can be established by means of numbers or other identifying marks, the selection of specimen sheets should start from the top of the first group of six sample bales and from the bottom of the second group of six sample bales. This alternating procedure should be followed for successive groups of six bales.

6.3 Cutting the test pieces

From each of the specimen sheets selected, a triangular test piece is taken by making two *straight* cuts through the sheet from the edge to the centre. These triangles (see clause 9.3) have their bases at the outside edges and apices at the centre of the sheets. All test pieces used in the test have either the same area, or a constant apex angle of 24° .

It is very important that each specimen sheet should remain in contact with the sheet underneath when the test piece is cut and that the cutting of the test piece is carried out on the same bale at the moment when the specimen sheet is exposed.

Alternative 1 : Constant area

From the first bale of a group of six sample bales, proceed as follows.

Cut test pieces in the shape of triangles in which the apices should be at the centre of the sheets and where the lengths of the bases of the triangles are

$$\frac{a}{7.5} \text{ and } \frac{b}{7.5}$$

where

a is the length of the long side of the sheet,

b is the length of the short side of the sheet.

The test piece cut from the first specimen sheet has one side which coincides with a sheet diagonal (starting point shown in Fig. 2).

If the specimen sheets vary in substance*, and as a consequence of this also in thickness, compensate this by cutting narrower test pieces from the thicker sheets and wider ones from the thinner sheets.

Cut the test pieces from the consecutive specimen sheets as indicated in Figure 2. These five triangular pieces together form the sample from bale No. 1.

In sample bale No. II the test pieces are cut from consecutive positions clockwise of the respective test piece positions in sample bale No. I, and progressively for sample bales Nos. III, IV, V and VI.

Use the same procedure for each group of six sample bales.

From each of these groups the total area of the test pieces is equivalent to one sheet. If, however, the pulp properties and sheet shapes cause difficulty in cutting the test pieces, it is permissible to double the area of *every* test piece.

The procedure for cutting test pieces with constant area is illustrated in Figure 2 below.

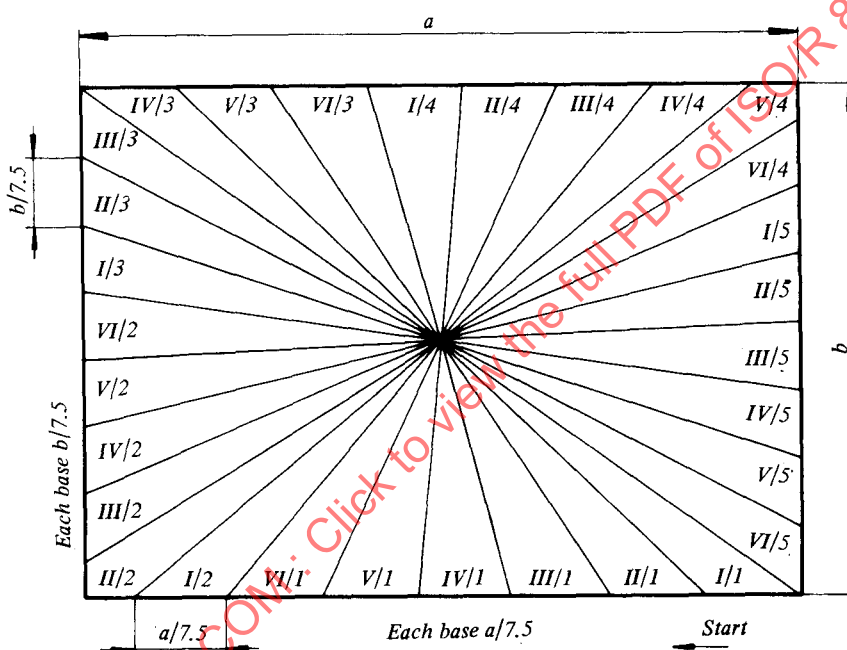


FIG. 2 — Diagram illustrating how test pieces with constant area are to be cut from specimen sheets selected according to the diagram given in Figure 1

Roman figures : number of bale

Arabic figures : number of specimen sheet

Alternative 2 : Constant angle

From the first bale of a group of six sample bales, proceed as follows.

Cut test pieces in the shape of triangles in which the angle at the apices is constant and equals 24° . The apices should be at the centre of the sheets.

* Mass per square metre.

7. CALCULATION AND REPORTING OF RESULTS

For bales not wrapped in pulp sheets and without specifications (for other circumstances, see clauses 9.1 and 9.4), calculate as follows :

$$X = \frac{(b_1 a_{1/100} + b_2 a_{2/100} + \dots + b_n a_{n/100}) d \times 100}{e.c}$$

where

- X is the saleable mass (e %) of pulp in lot, rounded to the nearest kilogramme,
 $a_1, a_2 \dots a_n$ is the absolute dryness of each group of six sample bales, rounded to the first nearest decimal place, expressed as a percentage,
 $b_1, b_2 \dots b_n$ is the gross mass of each group of six sample bales (total of the mass of six bales) (see clause 6.1),
 c is the number of bales sampled,
 d is the total number of bales in the lot,
 e is the commercial dryness, expressed as a percentage.

8. TEST REPORT

Report the saleable mass of the lot as determined.

Report if the test pieces were cut with constant area or with constant angle at the peak.

Report any out of the ordinary or optional details of procedure as well as any not provided for in this ISO Recommendation, and any incidents that may have affected the results.

A typical form used for reporting the results is given in Annex A.

9. REMARKS

- 9.1 **Bales wrapped in pulp sheets.** If the wrappers are to be analysed separately (see clause 6.1), each bale should be weighed intact and the wrapper or wrappers removed and weighed separately (the wrapper comprises all the pulp sheets which are folded over the sides of the bales and the pulp sheets outside of these). The gross mass of the wrappers is then deducted from the gross mass of the intact bales to determine the gross mass of the contents of bales. The mass of packaging wires or strappings is included in the mass of the contents of the bales.

The wrappers of each group of six bales are sampled by selecting a single test piece comprising a diagonal strip 10 cm wide cut simultaneously from all the wrappers on one bale in every group of six. The absolute dryness is determined in the same manner as described above for triangular test pieces.

The contents should be sampled in the ordinary way as for unwrapped bales.

The saleable mass of such bales is arrived at by adding together, for each group of six bales, the saleable masses, separately determined, of the wrappers and the contents.

- 9.2 **Pulp bales composed of sheets folded or in juxtaposition.** Pulp sheets are sometimes delivered folded two or more times into laps to conform to the size of the bale. In such cases the word "sheet" should be interpreted as applying to only one thickness of the lap. If several sheets are folded into one lap, the test piece should be drawn from the sample sheet defined above. It is advisable to cut the pulp sheet(s) along the fold of the lap to determine the exact position from which the specimen sheet should be drawn.

Where the bales are composed of two adjacent sheet piles, the two sheets in juxtaposition on the same level should be considered as constituting one specimen sheet.

- 9.3 **Cutting the test pieces.** As a result of very full study, it has been decided to adopt two alternative ways of cutting the triangular test pieces (see clause 6.3).

In *Alternative 1* the test pieces are cut in a way that aims at them being equal in area.

In *Alternative 2* the test pieces are cut on an equal angle at the peak basis, so that the areas of the test pieces vary according to the position from which they are taken in the specimen sheets.

Alternative 1 is theoretically correct for representative sampling but believed by some to be difficult to operate in practice. *Alternative 2* is considered by some to be easier to follow. Data collected show that, in practice, the difference between the results obtained by the two ways of cutting the test pieces is likely to be negligible, and for this reason it has been agreed to recognize both alternatives.

- 9.4 **Lots with specification bale by bale (see clause 2.1).** The average saleable mass of the sample bales (arrived at by dividing the total saleable mass of the sample bales, according to the marker's specification, by the number of sample bales) should, as far as possible, be within $\pm 0.5\%$ of the average specified saleable mass of the whole lot (arrived at by dividing the specified saleable mass of the whole lot by the total number of bales).

In such cases, calculate as follows :

$$Y = \frac{(b_1 a_{1/100} + b_2 a_{2/100} + \dots + b_n a_{n/100}) f \times 100}{e.h}$$

where

Y is the saleable mass ($e\%$) of a pulp in lot, accompanied by a complete specification, expressed to the nearest kilogramme,

$a_1, a_2, \dots, a_n$ is the absolute dryness of each group of six sample bales rounded to the first nearest decimal place, expressed as a percentage,

$b_1, b_2, \dots, b_n$ is the gross mass of each group of six sample bales (total of the masses of six bales (see clause 6.1),

e is the commercial dryness, expressed as a percentage,

f is the saleable mass ($e\%$) of the lot according to the invoice, expressed in kilogrammes,

h is the saleable mass of the sample bales as calculated using the specification, expressed in kilogrammes.

If for some reason the test pieces from more than one group of six sample bales are combined into batches for weighing, the appropriate terms in the formula given in section 7 and above are defined as follows :

$a_1, a_2, \dots, a_n$ is the absolute dryness of combined groups of six sample bales rounded to the first nearest decimal place, expressed as a percentage,

$b_1, b_2, \dots, b_n$ is the gross mass of combined groups of six sample bales (see clause 6.1).

ANNEX A

A.1 EXAMPLE OF A FULL CERTIFICATE OF ANALYSIS AND RELATED CALCULATIONS

CERTIFICATE OF ANALYSIS

We certify that we have sampled and tested for saleable mass a lot of bales of prime unbleached sulphate pulp said to consist of 200 bales, order No. 12 345.

Marked :	AAA blue
Stored at :	EFGH mill
Method of storage :	in enclosed building
Name and address of seller and buyer :	Mamoë-Durand – Papeterie Dupont
Documents identifying the lot :	number and date of manufacture, specifications of dryness bale by bale
Method of transport :	ship
Date of sampling :	15.11.62
Place of sampling :	ABCD
Number of bales available before testing (approximately) :	200
State of bales :	good
Type of wrapper :	pulp sheets

The analysis was carried out according to the ISO Recommendation R 801, *Pulps – Determination of saleable mass, in lots, of pulp baled in sheet form*, cutting the test pieces with constant area/angle*.

Number of bales sampled :	36
Total number of bales in the lot	200
Calculated oven-dry mass of sample bales :	5300, 7 kg.
Saleable mass (90 %) of sample bales as calculated using the specification (when available)	(5881,7) kg**
Saleable mass (90 %) of bales of pulp in lot according to the invoicing (when available)	(32 676) kg
Saleable mass (90 %) of baled pulp in lot according to the analysis :	32 720 kg

If required

- | | |
|---|-------------|
| (a) shortage or excess (on invoiced weight) expressed in kilogrammes : | (+) 44 kg |
| (b) shortage or excess (on invoiced weight) expressed as a percentage : | (+) 0.135 % |

The details of sample bales and test pieces are given in section A.2

Certified by : (name)

Date :

* Delete that which does not apply.

** Values corresponding to calculations using the specification are given in brackets.

A.2 DETAILS OF SAMPLE BALES AND TEST PIECES

(The gross mass of the bales has been expressed to the nearest 0.2 kg)

	Bale		Test pieces			Bale group	
	Order number	Gross mass	Wet mass	Oven-dry mass	Absolute dryness	Oven-dry mass calculated according to	
		kg				test	specification
			g	g	%	kg	kg
1	25 912	199.2					(155.1)
	25 867	199.0					(153.5)
	25 789	198.6					(150.5)
	25 748	198.4					(146.3)
	25 707	199.2					(153.7)
	25 826	199.0					(152.9)
	TOTAL	1193.4				921.2	(924.0)
2	Wrappers	14.0	142.2	120.9	85.0	11.9	(12.0)
	Pulp	1179.4	858.7	662.3	77.1	909.3	(912.0)
	25 670	198.0					(150.5)
	25 625	198.2					(148.3)
	25 587	199.2					(153.7)
	25 550	199.0					(151.3)
	24 309	197.0					(129.1)
3	24 268	197.2					(131.0)
	TOTAL	1188.6				868.1	(875.9)
	Wrappers	15.0	137.8	115.7	84.0	12.6	(12.0)
	Pulp	1173.6	921.0	671.6	72.9	855.5	(863.9)
	22 491	197.8					(130.3)
	22 292	197.2					(140.3)
	22 454	197.2					(133.5)
4	22 413	198.0					(138.3)
	22 255	197.4					(138.3)
	22 210	197.6					(138.7)
	TOTAL	1185.2				838.4	(831.4)
	Wrappers	15.6	152.4	124.5	81.7	12.7	(12.0)
	Pulp	1169.6	990.8	699.5	70.6	825.7	(819.4)
	21 354	197.2					(135.3)
5	22 131	197.4					(137.3)
	22 173	198.0					(136.7)
	22 095	197.6					(142.7)
	21 317	196.2					(132.5)
	21 276	197.0					(134.5)
	TOTAL	1183.4				823.1	(831.0)
	Wrappers	14.8	140.8	114.7	81.5	12.1	(12.0)
6	Pulp	1168.6	966.0	670.4	69.4	811.0	(819.0)
	21 239	197.0					(126.9)
	18 506	198.8					(150.5)
	18 469	199.0					(145.5)
	18 428	198.2					(149.9)
	18 151	199.4					(154.9)
	18 106	199.2					(143.3)
7	TOTAL	1191.6				897.1	(883.0)
	Wrappers	14.6	140.7	115.8	82.3	12.0	(12.0)
	Pulp	1177.0	877.3	659.7	75.2	885.1	(871.0)
	26 671	198.2					(154.9)
	26 708	199.2					(151.7)
	26 786	198.4					(159.5)
	26 749	199.2					(156.5)
8	26 868	199.2					(156.1)
	26 831	198.8					(157.5)
	TOTAL	1193.0				952.8	(948.2)
	Wrappers	13.8	149.0	127.4	85.5	11.8	(12.0)
	Pulp	1179.2	853.2	680.9	79.8	941.0	(936.2)
	TOTAL					5300.7	(5293.5)