INTERNATIONAL STANDARD

ISO 801-2

Second edition
1994-08-01

Pulps — Determination of saleable mass in lots —

Part 2:
Pulps (such as flash-dried pulps) baled in slabs

Pâtes — Détermination de la masse marchande des lots —
Partie 2: Balles de pâte en plaques (pâte séchée en flocons)

Reference number
ISO 801-2:1994(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 801-2 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 5, *Test methods and quality specifications for pulp*.

This second edition cancels and replaces the first edition (ISO 801-2:1979), of which it constitutes a technical revision.

ISO 801 consists of the following parts, under the general title *Pulps — Determination of saleable mass in lots*:

— *Part 1: Pulp baled in sheet form*

— *Part 2: Pulps (such as flash-dried pulps) baled in slabs*

— *Part 3: Unitized bales*

Annexes A and B of this part of ISO 801 are for information only.

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Introduction

The extreme difficulty encountered in the cutting of wedges from thick slabs of pulp, such as flash-dried pulp, for which this test method has been designed, has led to the adoption of a disc sampling procedure, following an extensive investigation (practical and statistical) of the problem. A brief statement of this investigation is given in annex B.

It is recognized that, although the wedge system of sampling is, in theory, more accurate than the disc system, the drilling procedure specified in this part of ISO 801 may be regarded as satisfactory because, in practice, the moisture variation from place to place is relatively small (for example in flash-dried pulps).

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Pulps — Determination of saleable mass in lots —

Part 2:
Pulps (such as flash-dried pulps) baled in slabs

1 Scope

This part of ISO 801 specifies a method for determining the dryness of a lot of pulp baled in slabs and for calculating its saleable mass.

This method is applicable to most kinds of pulp, in bales of approximately 200 kg, and made up of four to six slabs or wads, of fairly uniform and similar thickness. It may also be applicable to bales not composed of individual layers, but which are naturally delaminateable. It does not apply to pulp baled in sheet form or to pulp in unitized bales.

The method is not applicable if the drilling device becomes appreciably hot because of frictional heat evolved during drilling; this can occur with some strong chemical or semichemical pulps.

An example of a full certificate of analysis and related calculations is given in annex A.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 801. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 801 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 801-1:—[1], *Pulps — Determination of saleable mass in lots — Part 1: Pulp baled in sheet form.*

3 Definitions

For the purposes of this part of ISO 801, the following definitions apply.

3.1 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 interested 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 (3.2) and its absolute dryness (3.4),

or

— its saleable mass (3.7).

1) To be published. (Revision of ISO 801-1:1979)

3.2 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.

3.3 oven-dry mass: The mass obtained on drying pulp at 105 °C ± 2 °C, until constant mass is reached.

3.4 absolute dryness: The ratio of the oven-dry mass (3.3) of the pulp to its initial mass, expressed as a percentage.

3.5 air-dry mass: The mass of the pulp when its moisture content is in equilibrium with the ambient atmosphere.

3.6 theoretical commercial dryness: A conventional equilibrium value of 88 % or 90 % according to the country and/or commercial agreements.[2)]

3.7 saleable mass: The gross mass (3.2) multiplied by the absolute dryness (3.4) divided by the theoretical commercial dryness (3.6). Usually, it approximates to the air-dry mass (3.5).

3.8 invoiced mass: The saleable mass (3.7) indicated by the vendor on the invoice.

4 Principle

Sample bales are taken from the lot in number which is a function of the total number of bales and slabs in the complete lot and in accordance with a sliding scale. The sample bales are weighed individually and collected in groups containing equal numbers of bales. A disc-shaped test piece is cut from every lap or wad. The test pieces are weighed and dried to constant mass to determine their oven-dry mass. The saleable mass of the lot is then calculated.

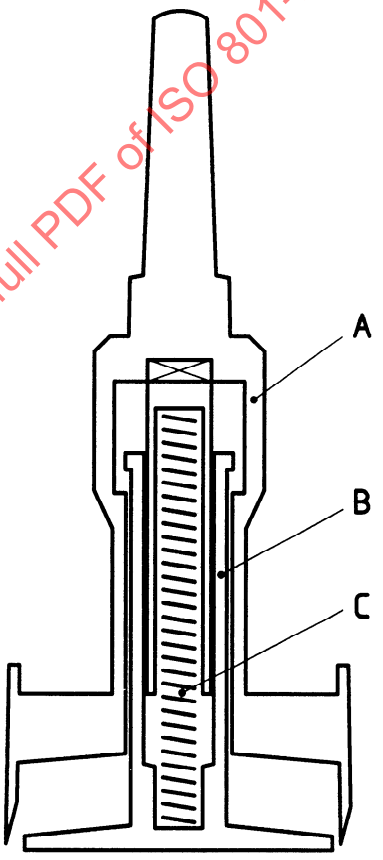
5 Apparatus

5.1 Scale, suitable for weighing the bales to an accuracy of at least 1/1 000.

5.2 Balance, suitable for weighing the test pieces to an accuracy of at least 1/5 000. The balance shall have a capacity of at least 5 kg and a sensitivity of 0,1 g. Its weighing pan (or weighing table) shall be wide enough to accommodate the test pieces so that they do not protrude outside the rim of the pan.

NOTE 1 As the test pieces are weighed when still hot, they cause an upstream flow of air around the weighing pan and, in consequence, a negative error in the balance reading. This error is minimized if the pan is wide enough so that no part of the test pieces protrudes outside the rim of the pan.

5.3 Equipment, for cutting the disc-shaped test pieces, comprising a commercial drill of about 1 kW, a drill stand, and a cutting tool. (See figures 1 and 2.)



Outer rotating part, consisting of a cone, an outer casing with four arms holding two cutting knives, and two chip breakers.

Inner stationary part, consisting of a circular footplate, and an inner casing with spring holder and ball bearing.

Coil spring, which expands between the rotating and the stationary parts.

Figure 1 — Cutting tool (see 5.3)

2) If the air dryness is 90 %, the pulp contains 90 parts by mass of absolutely dry fibres and 10 parts by mass of water. For an air dryness of 88 %, the corresponding figures are 88 and 12.

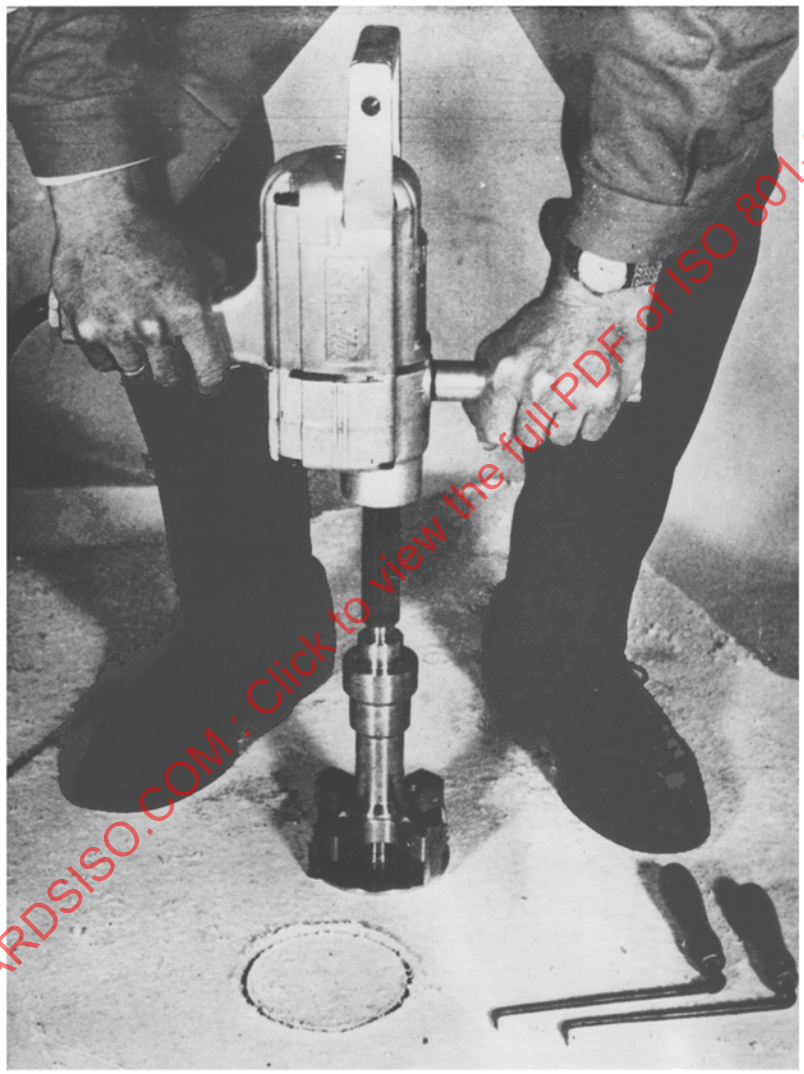


Figure 2 — Cutting tool in use

5.4 Series of 35 cards, showing the complete sequence of sampling positions in each lap or wad from which the discs are to be cut. (See clause 7 and figures 3 and 4.)

One sample is taken from every wad, in the position indicated by the sampling cards, which have one corner clipped to ensure correct orientation. Thirty-five cards are prepared and one sampling position is marked on each, so that each card represents the surface of one slab. A card size of 100 mm × 75 mm is suitable. The cards are divided into seven strips of equal width in one direction, and five in the other, thus giving 35 sampling positions over the whole surface of the lap.

5.5 Equipment, for storing the test pieces to prevent them from gaining or losing mass before weighing.

5.6 Drying oven, with good ventilation, and capable of being controlled at 105 °C ± 2 °C.

5.7 Drying containers, fitted with wire mesh.

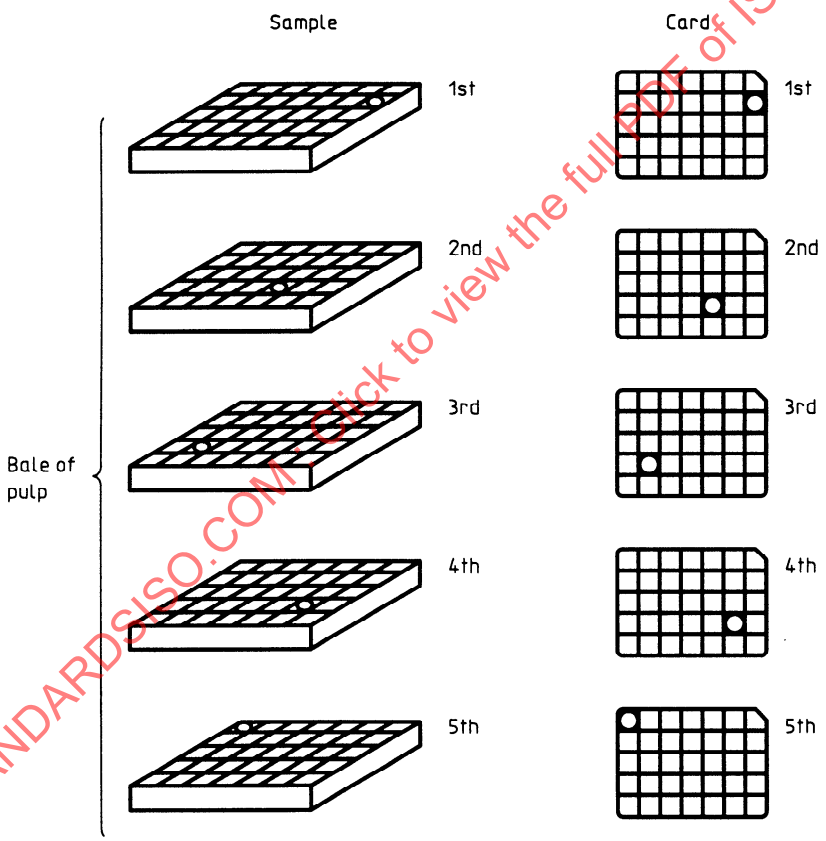


Figure 3 — The random card system (see 5.4)

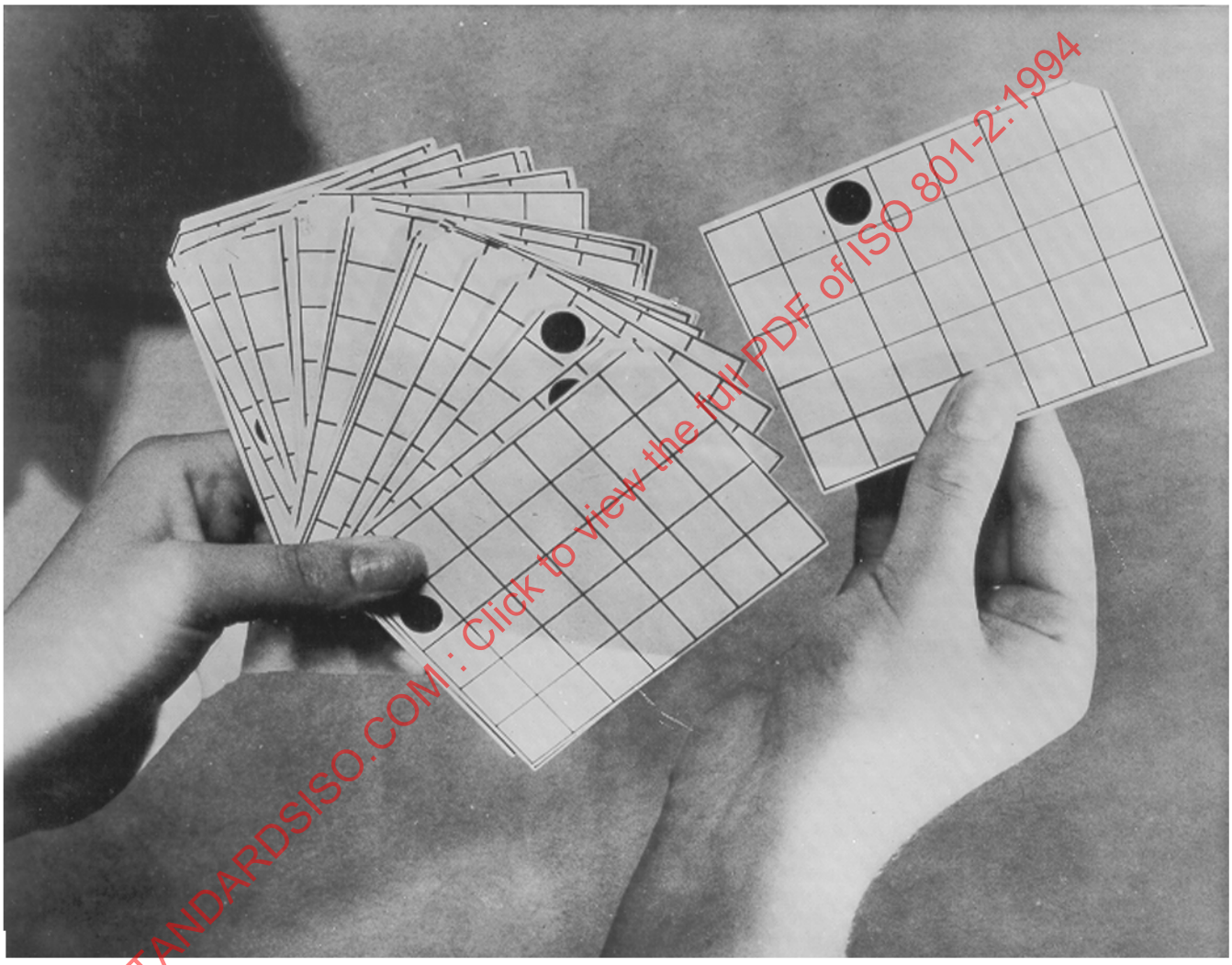


Figure 4 — Sample selection by the random card system

6 Sample bales

For instructions concerning sample bales and sampling, see ISO 801-1. The number of sample bales is specified in table 1 of ISO 801-1; however, the total number of slabs in the bales taken shall be as close as possible to a whole multiple of 35. The application of this principle to the most common cases (4, 5 or 6 slabs per bale) is illustrated in table 1of this part of ISO 801.

Table 1 — Number of sample bales to be taken

Total number of bales in lot	Number of sample bales for					
	4 slabs/bale		5 slabs/bale		6 slabs/bale	
	min.	max.	min.	max.	min.	max.
Up to 100	18	36	14	28	12	24
101 to 200	27	54	21	42	18	36
201 to 300	36	72	28	56	24	46
301 to 400	36	72	28	56	24	48
401 to 500	36	72	28	56	24	48
501 to 600	45	90	35	70	30	60
601 to 700	45	90	35	70	30	60
701 to 800	54	108	42	84	36	72
801 to 900	54	106	42	84	36	72
901 to 1 000	63	126	49	98	42	84
1 001 to 2 000	72	144	56	112	48	96
2 001 to 3 000	90	180	70	140	60	120
3 001 to 4 000	108	216	84	168	72	144
4 001 to 5 000	144	288	112	224	96	192

NOTE — Above 5 000, the minimum or maximum number is that given for 5 000 bales, plus 1 % of the bales in excess of 5 000. The total number of slabs taken shall be as close as possible to a multiple of 35.

7 Procedure

7.1 Weighing of sample bales

Determine the gross mass of each sample bale separately and record it to an accuracy between 1/500 and 1/1 000.

If the moisture content of the wrappers obviously differs from that of the rest of the bale, or if the wrappers are invoiced separately, test them separately in accordance with 8.2.

7.2 Selection of specimen slabs or wads

Sample every slab or wad in the table.

7.3 Cutting the test pieces

See figures 1 and 2.

From each slab or wad of pulp comprising the complete base, cut a disc-shaped test piece, of diameter 100 mm ± 2 mm, with the cutting tool (see 5.3 and figures 1 and 2) or a suitable modification of it. The test pieces when detached shall be of equal thickness, approximately 20 mm. Place the test pieces in the storing equipment (5.5) to prevent gain or loss of moisture, until the desired quantity has been accumulated for weighing as a batch. The positions of the discs to be taken from each slab are those indicated by the random card system (5.4). Drill each slab once only and collect the drillings in batches preferably containing samples from each individual bale.

The discs taken from the peripheral positions shall be taken at a distance of 5 mm to 10 mm from the edges of the slab.

7.4 Sampling using the random card system

See figures 3 and 4.

Shuffle the 35 cards and then take the first sample from the top slab at the position shown on the top card. Sample the second slab in a similar way at the position indicated on the second card.

Continue this procedure through each slab of the bales to be sampled until 35 positions have been sampled. Reshuffle the pack of cards, and take the next sample as indicated by the top card. Use this procedure continuously, irrespective of the number of slabs contained in the bale.

NOTE 2 Accurate judgement of the sampling position can be made by reference to the marked sample card. However, if desired, a procedure which will assist the operator is to construct a lattice of the same dimensions as the slabs in the bale, and with the same number of squares as that shown on the cards. The lattice is then placed on the surface of the slab to be drilled, and the disc can be cut while it is still in position.

7.5 Weighing and drying of the test pieces

Collect the test pieces obtained, preferably in batches containing those from a group of sample bales combined in such a way that the number of slabs tested is as close as possible to a multiple of 35. Weigh to an accuracy of at least 1/5 000.

NOTE 3 It is essential that test pieces be prevented from losing or gaining mass before weighing.

Ensure that the wire mesh at the bottom of the individual drying container (5.7) is sufficiently fine to retain small pieces of pulp, which can break away from some friable dry pulps, such as flash-dried groundwood.

Dry the test pieces in the ventilated oven (5.6), controlled at 105 °C ± 2 °C, until the mass is constant. This mass is considered to have been reached when two consecutive weighings, at an interval of at least 1 h, do not differ by more than 1/5 000.

Weigh the test pieces on the balance (5.2) immediately after their removal from the oven. The time interval from removal to weighing shall be less than 30 s.

NOTE 4 A prolonged time period between removal and weighing may cause a positive error in the oven dry mass, due to uptake of moisture from the ambient atmosphere.

8 Expression of results

8.1 Bales without wrappers and without specification

The saleable mass X (at c %) of pulp in the lot is given, in kilograms, by the equation

$$X = \left(m_1 \frac{a_1}{100} + m_2 \frac{a_2}{100} + \ldots + m_n \frac{a_n}{100}\right) \times \frac{N_1}{N_2} \times \frac{100}{c}$$

$$= \frac{(m_1 a_1 + m_2 a_2 + \ldots + m_n a_n) \times N_1}{N_2 \times c} \quad \ldots (1)$$

where

$m_1, m_2, \ldots, m_n$ is the gross mass (3.2) of the groups of sample bales, expressed in kilograms;

$a_1, a_2, \ldots, a_n$ is the absolute dryness (3.4) of the groups of sample bales, expressed as a percentage and rounded to one decimal place;

N_1 is the total number of bales in the lot;

N_2 is the number of bales sampled;

c is the theoretical commercial dryness (3.6), expressed as a percentage.

Express the result to the nearest 1 kg.

8.2 Bales wrapped in pulp or paper sheets

When pulp is wrapped in wrappers consisting of pulp or paper sheets which have a moisture content which obviously differs from that of the remainder of the bale, or if wrappers are sold separately, the whole bale shall be weighed intact, and the wrapper or wrappers removed and weighed separately (the wrappers comprise all the pulp or paper sheets folded over the sides of the bales, and the sheets outside these). The gross mass of the wrappers, including wires or strappings, is then deducted from the gross mass of the intact bales for determination of the gross mass of the contents of bales.

The test piece from the wrappers comprises a diagonal strip 100 mm wide cut from all the wrappers on one bale in every group of bales. The absolute dryness is determined in the same manner as that specified in 7.5 for disc test pieces.

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

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

8.3 Specification lots

A specification lot of pulp is one in which either the air-dry or the oven-dry mass of every bale is given, or the gross mass together with the absolute dryness of every bale is given.

Every possible means shall be taken, as with non-specification pulp, to ensure the selection of a representative range of sample bales. The average air-dry mass of the sample bales (arrived at by division of the total air-dry mass of the sample bales, according to the maker's specification, by the number of sample bales) should, as far as possible, be within ± 0,5 % of the average specified air-dry mass of the whole lot (arrived at by dividing the specified air-dry mass of the whole lot by the total number of bales).

Calculate as follows:

The saleable mass Y (at c %) of pulp in a lot accompanied by a complete specification is given, in kilograms, by the equation

$$Y = \left(m_1 \frac{a_1}{100} + m_2 \frac{a_2}{100} + \ldots + m_n \frac{a_n}{100}\right) \times \frac{d}{e} \times \frac{100}{c} \quad \ldots (2)$$

where

$m_1, m_2, \ldots, m_n$ is the gross mass (3.2) of the groups of sample bales, expressed in kilograms;

$a_1, a_2, \ldots, a_n$ is the absolute dryness (3.4) of the groups of sample bales, expressed as a percentage and rounded to one decimal place;

d is the saleable mass (at c %), of the lot, according to the specification, expressed in kilograms;

e is the saleable mass of the sample bales, as calculated using the specification expressed in kilograms;

c is the theoretical commercial dryness (3.6), expressed as a percentage.

Express the result to the nearest 1 kg.

8.4 Combined groups

If for some reason the test pieces from more than one group of sample bales are combined into batches for weighing, the appropriate terms in equations (1) and (2) are defined as follows:

$m_1, m_2, \ldots, m_n$ is the gross mass (3.2) of combined groups of sample bales, expressed in kilograms to the nearest 0,5 kg;

$a_1, a_2, \ldots, a_n$ is the absolute dryness (3.4) of combined groups of sample bales, expressed to one decimal place.

9 Test report

The test report shall include the following particulars:

a) a reference to this part of ISO 801;

b) all indications necessary for complete identification of the lot;

c) the saleable mass of the lot, expressed in kilograms;

d) any unusual features observed in the course of the test;

e) any operations not specified in this part of ISO 801 or regarded as optional, which might have affected the results.

A typical form for reporting the test results is given in annex A.

Annex A
(informative)

Example of a full certificate of analysis and related calculations

A.1 Certificate of analysis

We certify that we have sampled and tested for saleable mass a lot of bales of prime unbleached sulfate pulp said to consist of 200 bales, order No. 12345.

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:	1978-11-15
Place of sampling:	ABCD
Number of bales available before testing (approximately):	200
State of bales:	Good
Type of wrapper:	Paper

The analysis was carried out in accordance with ISO 801-2, *Pulps — Determination of saleable mass in lots — Part 2: Pulp (such as flash-dried pulp) baled in slabs*.

Number of bales sampled:	35
Number of slabs in bale:	5
Total number of bales in lot:	200
Calculated oven-dry mass of sample bales:	5 134,6 kg
Saleable mass (at 90 %) of sample bales as calculated using the specification (when available):	(5 720,2) kg*
Saleable mass (at 90 %) of bales of pulp in lot according to the invoicing (when available):	(32 687) kg
Saleable mass (at 90 %) of baled pulp in lot according to the analysis:	32 601 kg
If required	
a) shortage or excess (on invoiced mass) expressed in kilograms:	86 kg shortage
b) shortage or excess (on invoiced mass) expressed as a percentage:	0,263 % shortage

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

Certified by: ..... (Name)

Date: .....

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

A.2 Details of sample bales and test pieces

Group No.	Bale		Test pieces			Bale group	
	Order number	Gross mass	Wet mass	Oven-dry mass	Absolute dryness	Oven-dry mass calculated according to test	Oven-dry mass calculated according to specification
		kg	g	g	%	kg	kg
1	26 671	198,2					(156,9)
	26 708	199,2					(153,7)
	26 786	198,4					(161,5)
	26 749	199,2					(158,5)
	26 868	199,2					(158,1)
	26 831	198,8					(159,5)
	25 912	199,2					(157,1)
	TOTAL	1 392,2	858,7	681,8	79,4	1 105,4	(1 105,3)
2	25 867	199,0					(155,5)
	25 789	198,6					(152,5)
	25 748	198,4					(148,3)
	25 707	199,2					(155,7)
	25 826	199,0					(154,9)
	25 670	198,0					(152,5)
	25 625	198,2					(150,3)
	TOTAL	1 390,4	921,0	700,0	76,0	1 056,7	(1 069,7)
3	25 587	199,2					(155,7)
	25 550	199,0					(153,3)
	24 309	197,0					(131,1)
	24 268	197,2					(133,0)
	22 491	197,8					(132,3)
	22 292	197,2					(142,3)
	22 454	197,2					(135,5)
	TOTAL	1 384,6	990,8	700,5	70,7	978,9	(983,2)
4	22 413	198,0					(140,3)
	22 255	197,4					(130,3)
	22 210	197,6					(140,7)
	21 354	197,2					(137,3)
	22 131	197,4					(139,3)
	22 173	198,0					(138,7)
	22 095	197,6					(144,7)
	TOTAL	1 383,2	966,0	685,9	71,0	982,1	(981,3)
5	21 317	196,2					(134,5)
	21 276	197,0					(136,5)
	21 237	197,0					(128,9)
	18 506	198,8					(152,5)
	18 469	199,0					(147,5)
	18 428	198,2					(151,9)
	18 151	199,4					(156,9)
	TOTAL	1 385,6	877,3	640,4	73,0	1 011,5	(1 008,7)
					TOTAL	5 134,6	(5 148,2)

A.3 Calculation

A.3.1 Without specification

$$\left(m_1 \frac{a_1}{100} + m_2 \frac{a_2}{100} + \ldots + m_n \frac{a_n}{100}\right)$$

$$= 1\ 105{,}4 + 1\ 056{,}7 + 978{,}9 + 982{,}1 + 1\ 011{,}5$$

$$= 5\ 134{,}6 \text{ kg}$$

$$X = \frac{5\ 134{,}6 \times 200 \times 100}{90 \times 35}$$

$$= 32\ 600{,}6 \text{ kg}$$

$$X = 32\ 601 \text{ kg}$$

A.3.2 With specification

Oven-dry mass of sample bales using the specification

$$= 1\ 105{,}3 + 1\ 069{,}7 + 983{,}2 + 981{,}3 + 1\ 008{,}7$$

$$= 5\ 148{,}2 \text{ kg}$$

$$e = \frac{5\ 148{,}2 \times 100}{90}$$

$$= 5\ 720{,}2 \text{ kg}$$

$$Y = \frac{5\ 134{,}6 \times 32\ 687 \times 100}{90 \times \frac{5\ 148{,}2 \times 100}{90}}$$

$$= \frac{5\ 134{,}6 \times 32\ 687 \times 100}{90 \times 5\ 720{,}2}$$

$$= 32\ 600{,}8 \text{ kg}^*$$

$$Y = 32\ 601 \text{ kg}$$

Percentage shortage or excess: – 0,263 or 86 kg

* The first expression of Y may be simplified if the calculation of e is not desired.

Annex B
(informative)

Report on investigations

Between 1969 and 1972, a series of experiments were carried out as a joint Finnish, Swedish and Norwegian enterprise, with a view to testing the proposed method: "British and Scandinavian Provisional Method of Testing Flash-Dried Pulp".

One major object of these investigations was to establish whether it was necessary to have a more precise specification of the locations for drilling out the peripheral test discs (at the edges of the slabs) to ensure obtaining the true dry matter content.

For normal bale and slab sizes, these discs can be drilled out in any position between 0 mm and 30 mm from the edge of the slab. The effect of this lack of precision on the final test result was unknown.

Two series of investigations were carried out, in both cases in respect of lots of mechanical pulp consisting of 36 bales, stored in 4 layers with 3 × 3 bales. The storage time was 1 month, giving average mass reduction of 5 kg and 8 kg per bale for the first and second series respectively.

In the first series, a comparison was made between the two extreme positions (0 mm and 30 mm), and in the second, the comparison concerned the 0-position and the middle position (approximately 15 mm).

The average deviation between the two positions for the first series was 0,25 % with the true value (determined by production at the mill) being found in between. For the second series, the difference was 0,56 %, again with the true value for the dry matter content in between. The results were also consistent in that the value found by employment of the 0-position gave too high a dry matter content.

As a consequence, the conclusion to be drawn from these experiments was quite clear, viz. that when drilling is effected in the peripheral position, the distance to the edge should be defined, at a distance of 5 mm to 10 mm from the edge of the slab.

This has now been correctly incorporated in the method specified in this part of ISO 801.