
International Standard



2170

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Cereals and pulses — Sampling of milled products

Céréales et légumineuses — Échantillonnage des produits de mouture

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Descriptors : agricultural products, cereal products, pulses (grains), sampling, quality control, sampling equipment, bulk products, transportation, labelling, sampling tables.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as international Standards by the ISO Council.

International Standard ISO 2170 was developed by Technical Committee ISO/TC 34, *Agricultural food products*.

This second edition was submitted directly to the ISO Council, in accordance with clause 5.10.1 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 2170:1972), which had been approved by the member bodies of the following countries :

Australia	India	Portugal
Austria	Iran	Romania
Canada	Ireland	South Africa, Rep. of
Chile	Israel	Spain
Czechoslovakia	Korea, Dem. P. Rep. of	Sri Lanka
Egypt, Arab Rep. of	Korea, Rep. of	Turkey
France	Netherlands	United Kingdom
Germany, F. R.	New Zealand	USSR
Hungary	Poland	

No member body had expressed disapproval of the document.

This International Standard has been prepared taking into account Standard No. 101 of the International Association of Cereal Chemistry (ICC).

Cereals and pulses — Sampling of milled products

0 Introduction

Correct sampling is an operation that requires most careful attention. Emphasis cannot therefore be too strongly laid on the necessity of obtaining a properly representative sample of milled cereal or pulse. Careless or inaccurate sampling could lead to misunderstanding and unwarranted financial adjustment.

The procedures given in this International Standard are recognized as good practice and it is strongly recommended that they be followed whenever practicable. It is recognized that it is difficult to lay down fixed rules to be followed in every case, and particular circumstances may render some modification of the method desirable, for example if it is desired to check the uniformity of a consignment by the examination of individual increments.

In certain areas there are widely recognized trade associations which prescribe rules for the sampling procedures to be used in contracts under their auspices. In no case will the methods described in this International Standard override the rules laid down in such contracts, or the rules of official inspecting organizations.

1 Scope and field of application

This International Standard specifies general conditions relating to the sampling for assessment of quality and condition of milled products from cereals and pulses, intended for human or animal consumption, in powder, particulate or agglomerated form.

It does not apply to whole unprocessed cereal grains or pulses, to seed grains or pulses, or to partially milled cereals or pulses which retain the form of the original material¹⁾. Starches and oils obtained from cereals or pulses are also excluded from the scope of this International Standard.

2 Definitions

For the purpose of this International Standard, the following definitions apply.

2.1 consignment : The quantity of product dispatched or received at one time and covered by a particular contract or shipping document. It may be composed of one or more lots.

2.2 lot : A part of a consignment or a consignment with presumed uniform characteristics, to which a given scheme of investigation can be applied.

2.3 increment : A small quantity of product taken from a single position in the lot.

A series of increments should be taken from different positions in the lot such that, when bulked, they will be representative of the lot.

2.4 bulk sample : The quantity of product formed by combining and mixing the increments taken from a specific lot.

2.5 laboratory sample; final lot sample : The quantity of product removed from the bulk sample and intended for analysis or other examination.

3 General

3.1 Samples shall be taken jointly by sampling superintendents appointed by buyers and sellers, or by a sampling superintendent appointed jointly.

3.2 Samples shall be fully representative of the lots from which they are taken. Therefore, as the composition of the lot is seldom uniform, a sufficient number of increments shall be

1) For the sampling of cereals as grain, see ISO 950, *Cereals — Sampling (as grain)*. This method is also suitable for the partially milled cereals mentioned. For the sampling of whole pulses, see ISO 951, *Pulses in bags — Sampling*. Examples of products which present difficulties in classification are given in annex B.

taken and carefully mixed, thus giving a bulk sample from which are obtained, by successive divisions, the laboratory samples. If the lot consists of a number of freight containers, samples shall be taken from each freight container.

3.3 It is essential that a product which is sea-damaged or otherwise damaged in transit or out of condition is kept separate from the sound product and sampled separately. Samples of the unsound material shall not be mixed with samples of the sound material.

3.4 Special care is necessary to ensure that all sampling apparatus is clean, dry and free from foreign odours.

Sampling shall be carried out in such a manner as to protect the samples, the sampling instruments and the containers in which the samples are placed from adventitious contamination such as rain, dust, etc.

4 Apparatus

Apparatus is required as follows (see figures 1 to 9 for examples).

NOTE — Many different types and variations of apparatus are available. The dimensions given in the figures are included, therefore, solely as a guide.

4.1 Sampling from bulk

Shovels, hand-scoops, cylindrical samplers and apparatus for taking increments periodically from a flow of milled product.

4.2 Sampling from bags

Sack-type spears or triers.

4.3 Mixing and dividing

Shovels and dividing apparatus.

5 Location of sampling

The location and time of sampling shall be determined by agreement between the parties concerned. Particular requirements applying to loading and discharge are given below.

5.1 Loading

It is important that milled products which are to be dispatched by vessel are sampled during loading, or immediately before, at the place of loading.

5.2 Discharge

When milled products are received from ocean-going vessels or river transport, sampling shall be carried out during discharge from the vessel.

5.3 Sampling from freight containers, tank cars or tank trucks

The sampling of products from freight containers, tank cars or tank trucks shall be carried out at the place of original loading or of final unloading.

6 Taking of increments

6.1 Increments from products carried in bulk

6.1.1 Carriage by sea or inland waterway

6.1.1.1 Unless otherwise specified in the contract, consignments shall be considered in lots of 500 tonnes¹⁾ or such part thereof as constitutes a single consignment or balance.

If the consignment is carried in a number of barges, each barge load shall constitute a lot.

6.1.1.2 When sampling takes place while the product is in motion, increments shall be taken at time intervals dependent on the rate of flow.

6.1.1.3 When a bulk product is sampled in the hold during loading or discharge, increments shall be taken from as many places as possible, excluding the run, and at intervals determined by the rate of loading or discharge.

6.1.1.4 If sampling takes place from weigh hoppers before weighing, increments shall be taken by means of cylindrical samplers, shovels, or mechanical samplers in accordance with the practice of the port.

6.1.1.5 The procedure for silos or warehouses is necessarily dependent on local conditions.

6.1.2 Carriage by rail or road

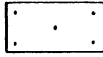
6.1.2.1 Unless otherwise specified in the contract, each laden wagon or lorry shall be sampled.

6.1.2.2 If sampling takes place from laden wagons or lorries, the increments shall be taken throughout the whole depth of

¹⁾ Metric tonnes. 1 t = 1 000 kg.

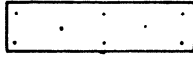
the product by means of a cylindrical sampler inserted vertically at the following points :

Wagons or lorries up to 15 t :



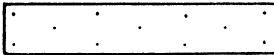
Five sampling points (middle and approximately 500 mm from sides)

Wagons from 15 to 30 t :



Eight sampling points

Wagons from 30 to 50 t :



Eleven sampling points

If agreed between the buyer and seller, increments may be taken at three levels (top, middle and bottom) instead of through the whole depth of the product.

6.1.2.3 If the type of wagon does not allow samples to be taken in this manner, or by agreement between buyer and seller, the method of sampling shall be as described in 6.1.1.2.

6.1.3 Carriage in freight containers, tank cars or tank trucks

Increments shall be taken as described in 6.1.2.2.

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6.2 Increments from products carried in bags or prepacked units

6.2.1 Carriage in bags

Unless otherwise specified in the contract or unless the practice at a port requires otherwise, the consignment shall be considered as a whole and increments shall be taken from different parts of each bag to be sampled (for example, top, middle and bottom) by means of a sack-type spear from the numbers of bags specified in table 1.

Table 1 — Number of bags to be sampled

in consignment	Number of bags to be sampled
Up to 10	Each bag
10 to 100	10, taken at random
More than 100	Square root (approximately) of total number, taken according to a suitable sampling scheme ¹⁾

1) See, for example, annex A.

When the walls of the bags sampled consist of material which does not permit the holes made by the sampling spear to close up naturally after removal of the spear, the holes shall be patched effectively after the samples have been taken.

6.2.2 Carriage in pre-packed units

Pre-packed units are usually transported in outer cases or cartons containing a convenient number of units.

The procedure applicable to bags, described in 6.2.1, shall be used for determining the appropriate number of outer cases or cartons to be sampled. If the total number of outer cases or cartons in the consignments does not exceed 1 000, only one pre-packed unit shall be taken from each of the outer cases or cartons taken for sampling.

Care shall be taken to ensure that a pre-packed unit is taken in a random manner from the entire contents of the outer case or carton taken for sampling. The selection of pre-packed units occupying the same corresponding position in a number of outer cases or cartons shall particularly be avoided.

The pre-packed units taken in this manner shall be considered as increments.

7 Bulk sample

The bulk sample shall be formed by combining the increments.

7.1 If the increments are taken from material which is not pre-packed, they shall be well mixed.

7.2 If the bulk sample consists of pre-packed units, the whole shall be forwarded for examination unless a different procedure is agreed between buyer and seller.

8 Laboratory samples

If the bulk sample is formed by combining increments of material which is not pre-packed, it shall be divided down to the required number of laboratory samples by use of the apparatus mentioned in clause 4. The number of laboratory samples to be taken for analysis and arbitration shall be specified in the contract or otherwise agreed between buyer and seller.

9 Size of samples

Samples of the sizes given in table 2 are usually suitable if the bulk sample is formed by combining increments of material which is not pre-packed.

Table 2 — Sizes of samples

Lot	Increment max.	Bulk sample max.	Laboratory sample
Up to 500 t	1 kg	100 kg	3 kg

Larger or smaller laboratory samples may be required in some cases, according to the tests to be carried out.

10 Packaging and labelling of samples

10.1 Packaging of samples

10.1.1 The samples shall be packed in containers made of a material which has no action on the product, for example glass bottles or jars, tins with close-fitting lids, unglazed, unbleached, insewn cotton bags of very close texture, or paper bags.

10.1.2 Samples for the determination of moisture, or for other tests in which it is important to avoid the loss of volatile matter (for example examination for evidence of chemical treatment), shall be packed in air-tight and moisture-tight containers fitted with air-tight closures. The containers shall be completely filled and the closures shall be sealed to prevent loosening or tampering.

10.1.3 The bags and other containers shall carry the seal of each sampler.

10.2 Labels for samples

If paper labels are used for the samples, they shall be of a suitably high quality for the purpose. The eyelet hole of the label should be reinforced. The label shall be sealed to the container holding the sample and shall carry the seal of each sampler; these seals shall be arranged in such a way as to guarantee the inviolability of the sample.

The information on the label shall include such of the following items as are required by the terms of the contract :

- 1) Ship, wagon or freight container
- 2) From
- 3) To
- 4) Date of arrival
- 5) Quantity
- 6) Bulk/Number of bags

- 7) Goods
- 8) Identification mark or Lot No.
- 9) Name of seller
- 10) Name of buyer
- 11) Contract number and date
- 12) Date of sampling
- 13) Date of final discharge
- 14) Place and point of sampling
- 15) Sampled by

The information recorded on the label shall be indelibly marked.

By agreement between seller and buyer, a duplicate label may be included inside the sample container, unless the sample is intended for moisture determination.

11 Dispatch of samples

Samples shall be dispatched as soon as possible, and only in exceptional circumstances more than 48 h after sampling has been completed, non-business days excluded.

12 Sampling report

If a sampling report is prepared, besides giving the usual information it shall make reference to the condition of the product sampled, including signs of insect, mite or rodent infestation visible in the warehouse, silo or during working the vessel or other carrier. This infestation is not always readily apparent in the sample except on close inspection or sieving. The report shall also refer to the sampling technique applied, if this differs from that described in this International Standard, and all the circumstances that may have influenced sampling.

Dimensions in millimetres

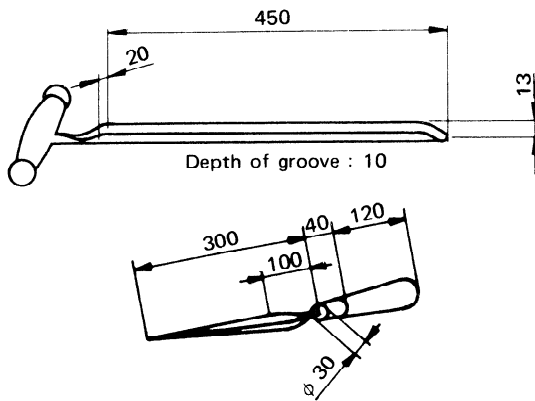


Figure 1 – Sampling spear (open trier)

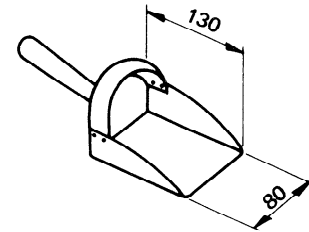


Figure 2 – Hand-scoop

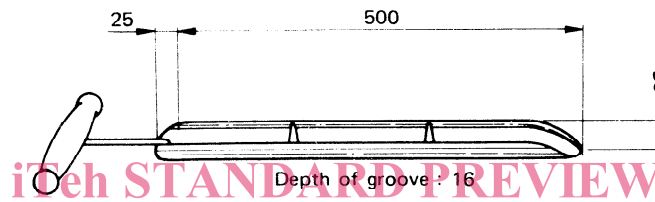


Figure 3 – Divided sampling spear (open trier)

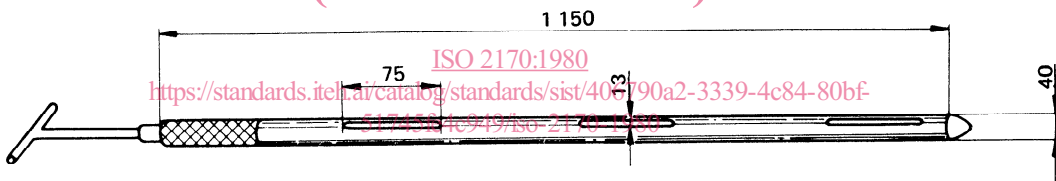


Figure 4 – Cylindrical sampler (divided bulk probe)

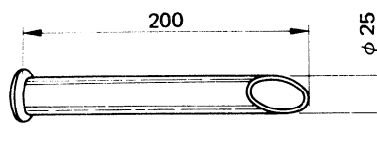


Figure 5 – Running iron (sack-type trier)

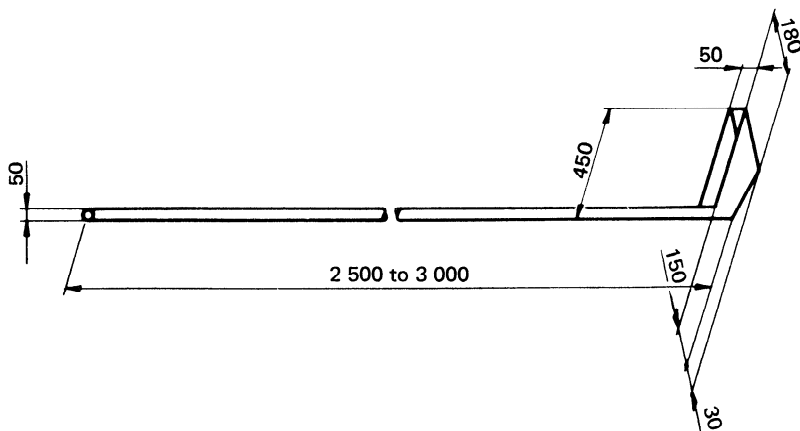


Figure 6 – Falling stream sampler (Pelican type)

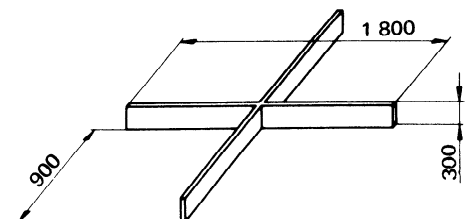


Figure 7 – Quartering irons

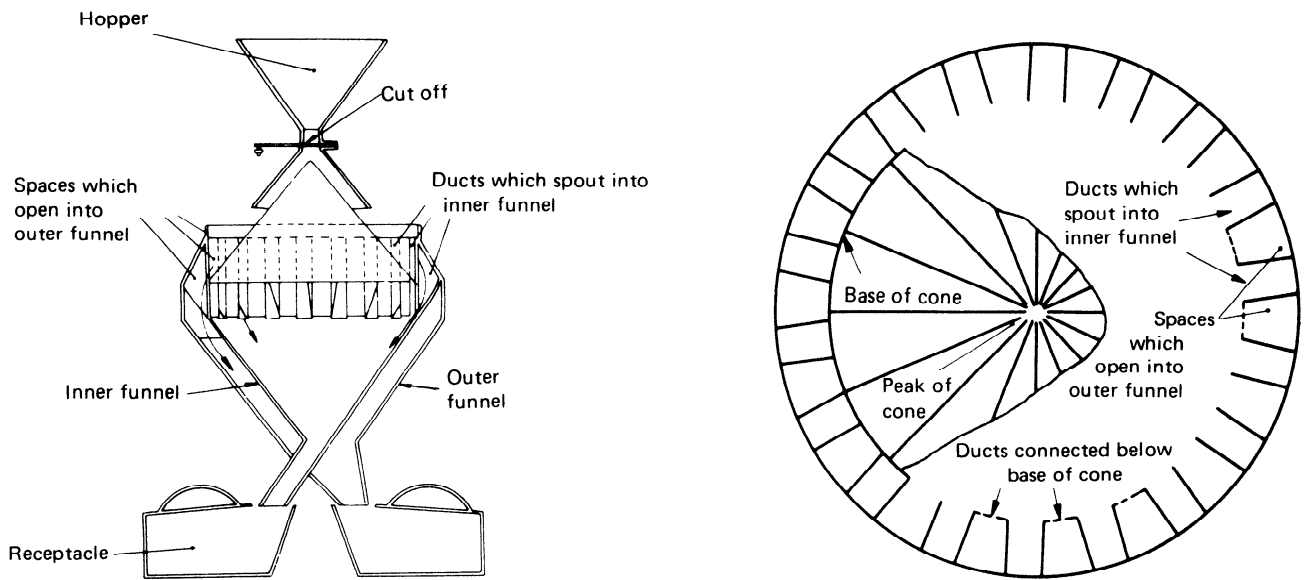


Figure 8 — Conical divider

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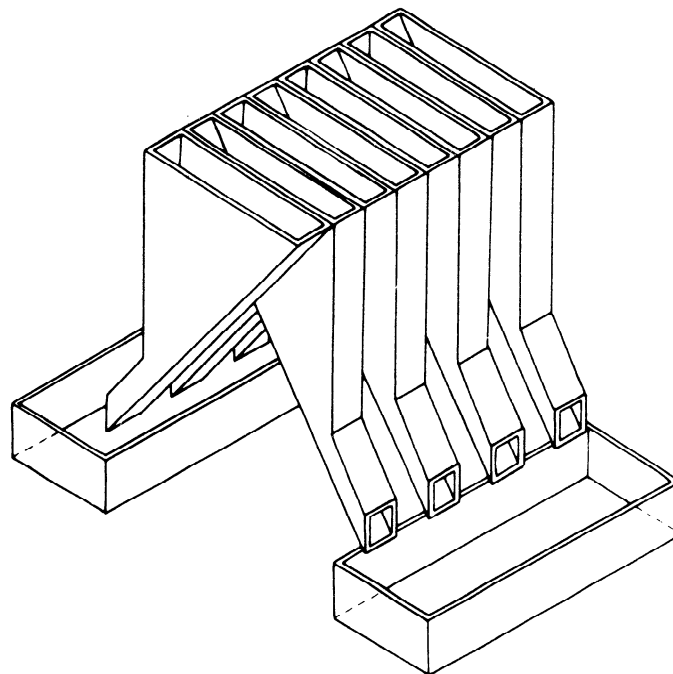


Figure 9 — Multiple-slot divider

Annex A

Sampling scheme for consignments of more than 100 units (bags or cases)

For consignments larger than 100 units, the number of units to be sampled equals approximately the square root of the number of units in the consignment. The consignment is mentally divided into a number of groups, each including a number n of units corresponding with the square root of the number of units in the consignment (rounded upwards). For sizes N of 101 . . . 10 000 units, the number of units forming one group is indicated in table 3. For each of these groups, one unit shall be selected at random for sampling.

If there is a remainder after dividing the consignment into a number n of units, one unit from this remainder shall also be taken for sampling.

It is recommended that the sampler writes down the numbers 1 . . . n and each time crosses out one number before drawing

from the group of n units and sampling the unit that corresponds with this number.

Example :

The consignment contains 200 units (N). For N equal to 197 . . . 225 the size n of each group equals 15 units. Note the numbers 1, 2, 3, . . . , 14, 15. Cross out one number, for example 7. Take from the first group of 15 units the seventh unit and sample it. Cross out another number, for example 3. Take from the second group of 15 units the third unit and sample it. Continue in this way until 13 groups of 15 units (a total of 195 units) have been sampled. The remaining group is smaller than 15 units; still take one unit at random out of it. A total of 14 units ($= n - 1$) has therefore been sampled out of a consignment of 200 units.

Table 3 — Sampling scheme for consignments of more than 100 units

N = Number of units in consignment; n = Number of units in group

N	n	N	n	N	n
101 . . . 121	11	1 601 . . . 1 681	41	4 901 . . . 5 041	71
122 . . . 144	12	1 682 . . . 1 764	42	5 042 . . . 5 184	72
145 . . . 169	13	1 765 . . . 1 849	43	5 185 . . . 5 329	73
170 . . . 196	14	1 850 . . . 1 936	44	5 330 . . . 5 476	74
197 . . . 225	15	1 937 . . . 2 025	45	5 477 . . . 5 625	75
226 . . . 256	16	2 026 . . . 2 116	46	5 626 . . . 5 776	76
257 . . . 289	17	2 117 . . . 2 209	47	5 777 . . . 5 929	77
290 . . . 324	18	2 210 . . . 2 304	48	5 930 . . . 6 084	78
325 . . . 361	19	2 305 . . . 2 401	49	6 085 . . . 6 241	79
362 . . . 400	20	2 402 . . . 2 500	50	6 242 . . . 6 400	80
401 . . . 441	21	2 501 . . . 2 601	51	6 401 . . . 6 561	81
442 . . . 484	22	2 602 . . . 2 704	52	6 562 . . . 6 724	82
485 . . . 529	23	2 705 . . . 2 809	53	6 725 . . . 6 889	83
530 . . . 576	24	2 810 . . . 2 916	54	6 890 . . . 7 056	84
577 . . . 625	25	2 917 . . . 3 025	55	7 057 . . . 7 225	85
626 . . . 676	26	3 026 . . . 3 136	56	7 226 . . . 7 396	86
677 . . . 729	27	3 137 . . . 3 249	57	7 397 . . . 7 569	87
730 . . . 784	28	3 250 . . . 3 364	58	7 570 . . . 7 744	88
785 . . . 841	29	3 365 . . . 3 481	59	7 745 . . . 7 921	89
842 . . . 900	30	3 482 . . . 3 600	60	7 922 . . . 8 100	90
901 . . . 961	31	3 601 . . . 3 721	61	8 101 . . . 8 281	91
962 . . . 1 024	32	3 722 . . . 3 844	62	8 282 . . . 8 464	92
1 025 . . . 1 089	33	3 845 . . . 3 969	63	8 465 . . . 8 649	93
1 090 . . . 1 156	34	3 970 . . . 4 096	64	8 650 . . . 8 836	94
1 157 . . . 1 225	35	4 097 . . . 4 225	65	8 837 . . . 9 025	95
1 226 . . . 1 296	36	4 226 . . . 4 356	66	9 026 . . . 9 216	96
1 297 . . . 1 369	37	4 357 . . . 4 489	67	9 217 . . . 9 409	97
1 370 . . . 1 444	38	4 490 . . . 4 624	68	9 410 . . . 9 604	98
1 445 . . . 1 521	39	4 625 . . . 4 761	69	9 605 . . . 9 801	99
1 522 . . . 1 600	40	4 762 . . . 4 900	70	9 802 . . . 10 000	100

For consignments larger than 10 000 units, n equals the square root of N , rounded upwards.