SCAN-CM 41:94
Revised 1994

SCANDINAVIAN PULP, PAPER AND BOARD
TESTING COMMITTEE

Wood chips for pulp production

Sampling

0 Introduction

This SCAN-test Method replaces SCAN-CM 41:89, from which it differs in that way that mainly editorial changes have been made.

1 Scope

The Method provides guidelines and recommendations for the sampling of wood chips intended for the production of chemical and mechanical pulps. Sampling from conveyer belts is described in detail as well as subdivision of samples.

The Method is applicable to quality control of consignments, to process control within a pulp mill and to subdivision of gross samples.

2 Definitions

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

2.1 *Lot* – A definite quantity of some commodity manufactured or produced under conditions which are presumed to be uniform.

2.2 *Consignment* – A quantity of some commodity delivered at one time. The consignment may consist of one or more lots or parts of lots.

2.3 *Sample* – A small part taken from a population and intended to provide information on the population and possibly to serve as a basis for a decision on the population or on the process which had produced it.

2.4 *Spot sample* – A quantity of material taken at one time from a larger body of material.

2.5 *Gross sample* – An aggregation of spot samples.

> *Note* – Definitions 2.1 to 2.5 are based on ISO 3534, Statistics – Vocabulary and symbols. However, ISO uses the term "increment" instead of "spot sample" (2.4 and 2.5). Statistical terms are defined in SCAN-G 2, Statistical treatment test results.

3 General remarks on sampling

Properties of wood chips, such as dry matter content and size distribution, may vary considerably within a lot. This may be due to a number of factors, such as variability in the origin of the logs chipped, the chipping technique, the way in which the chips were loaded and transported and weather conditions during storage.

To obtain test results that represent the average value of the required property, as would be obtained if the lot were thoroughly mixed, it is common practice to follow more or less well defined sampling procedures.

Such sampling procedures are designed to ensure that all parts of the lot to be sampled have an equal chance of being represented in a gross sample.

Another reason for having defined sampling procedures is to avoid the risk that the sample deviates from the bulk of material from which it is taken because of fractionation induced by the sampling itself.

A poor sampling technique may introduce systematic errors into the final test result. Systematic sampling errors may sometimes be very difficult to detect.

When wood chips are sampled, two common causes of systematic errors are:

(a) the spot samples are taken in positions where material with certain properties is over-represented, for example from only one side of a conveyer belt.
(b) the spot samples are taken so they are not representative of the material at the intended sampling point, for example by using a sampling device which is so small that large chips are excluded or by taking the sample from an area exposed to heat, wind or precipitation.

To avoid systematic errors, it is extremely important that the dimensions of the sampling device and the size of the spot sample are chosen with due regard to the particle size distribution of the lot. In some cases the systematic errors can be eliminated by changing the position or the construction of the sampling device, or by changing the sampling strategy.

Normally it is not possible to improve the accuracy or the precision merely by increasing the size of the spot sample. The precision is, however, improved by increasing the number of spot samples, although this does not eliminate inherent systematic errors in the sampling procedure.

Random sampling errors are primarily reduced by taking so many spot samples that the mean result, with a specified probability, deviates from the "true" mean by less than a given quantity.

A basic requirement is that all parts of the lot have the same chance of being included in the gross sample.

When chips are sampled, it is an advantage if all the lot is available for sampling. This is the case when the chips are transported on a conveyer belt. If the belt is stopped and all the chips on a sufficiently long section of the belt are taken, the systematic errors described under (a) and (b) above are greatly reduced.

Often it is not permissible to stop the belt as this interferes with mill operation. In such a case the end of the belt, where there is a free fall of chips, may be used as the sampling point. By moving a suitable container across the stream of chips, a spot sample representative of the whole width of the belt may be collected. The whole cross section of the stream of falling chips should be covered.

If the spot samples are collected manually, the sampler must have detailed instructions. The sampling time, the duration of the sampling period, the number of spot samples, the exact location of sampling points, the size of the samples and other details should be included in these instructions and not left to the sampler's discretion.

Automatic sampling devices should be carefully checked before installation so that no systematic sampling errors are introduced.

Samples of acceptable quality may also be obtained from stationary material (car loads, heaps etc.) provided that a relevant technique is applied. Stationary material is normally not uniform because of fractionation that occurs, for example when loading a car or building a heap. It is important that the sampling points are selected so that all parts of the lot are covered. Normally a larger number of spot samples are required than in sampling from moving material.

Sampling car loads by taking spot samples only from the top layer, for example, does not give a representative gross sample. Samples obtained from holes dug from the top of a car load also tend to be non-representative because large chips have a greater tendency than small ones to slide down from the sides of the hole.

The size of a spot sample must be so large that big chips are not excluded from the sample, and furthermore the size distribution of the sample must be representative of the lot sampled.

On the other hand, very big spot samples should be avoided because the gross samples will then also be big and difficult to handle. The number of spot samples must not be reduced to compensate for their large size.

4 Equipment

4.1 *Sampling from a moving conveyer belt*

4.1.1 *Bucket*, preferably of metal plate, having a volume of 5 to l0 litres. It must be possible to pass the bucket through the whole of the falling stream. The bucket is preferably mounted at the end of a beam having a counterweight at its other end, *Figure 1*.

4.1.2 *Sacks*, about l00 litres in volume, of strong plastic.

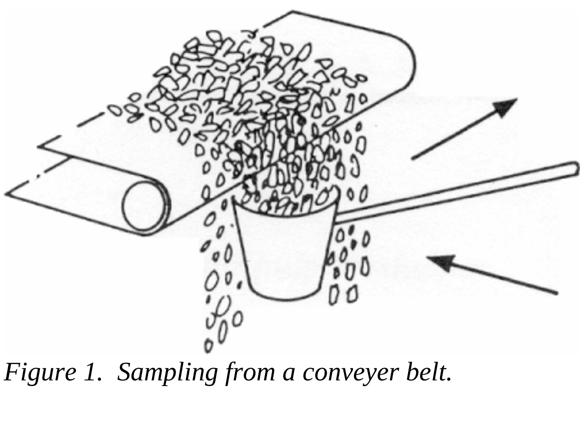

Figure 1. Sampling from a conveyer belt.

4.2 *Sampling from a stopped conveyor belt*

4.2.1 *Shovel and brush.*

4.2.2 *Sacks*, about l00 litres in volume, of strong plastic.

4.3 *Subdivision of samples*

4.3.1 *Mixing drum*, for example as shown in *Figure 2*.

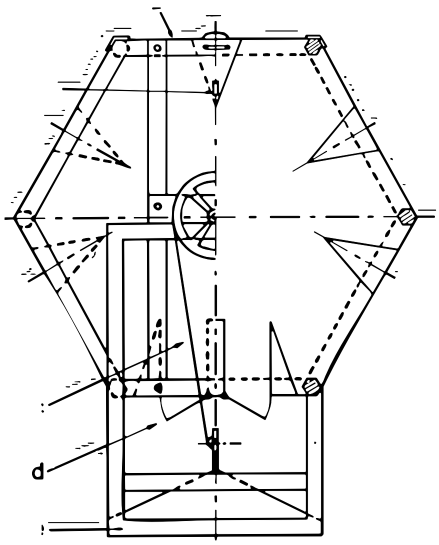

Figure 2. An example of a mixing drum for wood chips. The figure shows the end and a cross section of the drum, which is about 0,8 m high and 0,9 m in length.

The gross sample is introduced at (a); (b) is a lock for the cover; (c) marks a chamber where the sampled chips are collected. The chamber is emptied by opening the door (d). The drum is supported by the frame (e). Two samples of 8 to 10 litres are obtained.

5 Procedures

5.1 *Sampling from a moving conveyer belt*

Pass the bucket (4.1.1) through the falling stream of chips at the end of the belt (the overflow), see Figure l. Pass the bucket at a constant rate through the whole cross section of the stream. Change the direction of passage each time (from left to right and vice versa, forwards and backwards etc.). Choose the rate so that the bucket is nearly full after one passage. The rate must be high enough to avoid overfilling so that the material overflows. At time intervals chosen with regard to the purpose of the test, take preferably about l0 spot samples. Collect them in a sack (4.1.2). Their total volume shall be 60 to 80 litres.

5.2 *Sampling from a stopped conveyer belt*

Select a suitable section of the belt. Stop the belt, and with the aid of the shovel and brush (4.2.1), collect all chips including fines in this section in a sack (4.2.2). The volume shall be 60 to 80 litres.

Due to the great width of the belt, it is normally necessary to take a spot sample of this size in order to avoid fractionation. However, when sampling narrow belts several sections should be sampled whenever possible.

This procedure is recommended if the stream of chips is well mixed at the sampling point. The procedure should not be used if the sampling point is close to the chipper.

5.3 *Subdivision of samples*

The gross samples must be subdivided before analysis. In many of the methods, test samples of 8 to 10 litres are used. To obtain such test portions a mixing drum (4.3.1) is used for subdivision. If no such drum is available, empty the sack onto a clean, dry surface and mix the chips by shovelling. Form a circular, flat heap. Select at random one or several sections of about l0 litres and separate them from the heap.

The subdivision gives one or several laboratory samples. Transfer these samples to air-tight plastic bags and seal the bags immediately.

6 Identification marks

Mark the sample bags so that they can easily be identified. Record all facts that are necessary to ensure correct handling. Record also the time and place for the sampling.

SCAN-test Methods are issued and recommended by KCL, PFI and STFI-Packforsk for the pulp, paper and board industries in Finland, Norway and Sweden.
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