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Sampling and preparing wood for analysis

1. Scope and summary

- 1.1 This practice is applicable to the sampling of wood for all chemical tests.
- 1.2 The procedures describe the sampling of wood in all forms, i.e., logs, chips, or sawdust.
- 1.3 Two sampling plans are described: A probability sampling plan which provides test units from which some property of the wood may be determined within known and controlled limits at a minimum total cost; an economic or engineered sampling plan which minimizes errors due to variations in the raw material or the quality of the lot.

2. Significance

2.1 The physical procedures for obtaining the sample vary because of differences in form and in the condition of the wood (in bulk, in piles on the ground or in bins, in transit, in flumes, on conveyor belts, or separated into sublots in trucks, railroad cars, or containers). The various sampling devices used also affect the sampling procedure. The governing principle for obtaining an economical sampling is the use of a random selection procedure for the shipment or lot as a whole or for obtaining subsamples proportionally for subdivisions of the lot.

2.2 A probability sampling plan generally requires an estimate of the standard deviation of the lot, determination of the maximum allowable difference between the estimate of the average quality and the actual value, and selection of a probability factor to give a selected level of confidence to the decision regarding the lot.

2.3 In many commercial situations, there are significant economic consequences depending on the quality of the lot; for example, proper payment may depend upon the precise determination of some property; or in subsequent use of the wood, the acceptability of the final product may be sensitive to variation in the raw material. If the economic penalties of a wrong decision regarding the lot are considered to be significantly large, care should be exercised in selection of the sample according to a probability-based sampling plan. In some circumstances, however, where the economic differences are of minor consequence, and thus the penalty for making an erroneous decision is small, by mutual agreement an empirical or engineered sampling plan may be adopted.

Approved by the Standard Specific Interest Group for this Test Method



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3. Definitions

3.1 The term *random* carries the statistical implication of planned equality in the probability of selecting appropriate samples, not haphazard or subjective selections.

3.2 An *engineered sampling plan* is one using procedures based on a study of the physical aspects of obtaining samples in an unbiased manner and on experimentation to determine how to exercise maximum control over errors in sampling.

3.3 A *probability sampling plan* is one giving procedures for use of the theory of probability to combine a suitable method of selecting the sample with an appropriate method for summarizing the test results so that inferences may be drawn and risks calculated.

3.4 A *homogeneous lot* is one in which all the items are from the same statistical population or from populations with the same mean, standard deviation, and skewness.

4. Apparatus

4.1 *Saw*, power driven, for cutting disks from logs.

NOTE 1: The use of an electric handsaw or band saw is quite appropriate for cutting discs from small diameter logs, i.e., less than 150 to 200 mm. Diameters greater than 200 mm; however, dictate the use of an electric or gas-powered chain saw. These saws are now frequently equipped with an automatic chain lubrication system which must be cleaned up with a suitable solvent before use. The chain should be resharpened frequently during use to minimize heating.

4.2 *Screen*, U.S. Standard (ASTM E-11) 35 mesh (0.50 mm) for sifting finer material.

NOTE 2: A power-driven screen is preferable.

4.3 *Mill*, hand-driven or Wiley type (see 5.4.1)

4.4 *Mason jar*, or similar tight sealing container for keeping sample air-tight.

4.5 *Shovel or scoop*, for use in taking samples of chips.

5. Procedures

CAUTION: If chemical analysis is to be performed on test samples, do not use tools, or grinders, with metal surfaces to prepare the final test specimen for analysis as this could bias the test results.

5.1 *Engineered sampling plan*

5.1.1 Divide the lot into at least two subdivisions (on a rational basis considering its form and condition) and take at least two subsamples from each subdivision.

5.1.2 For logs, a practical way to attain randomness is to subdivide the shipment into approximately equal quantities by carloads, truckloads, or cords, identify each subdivision by number, and select the subdivisions to be included in the sample by the use of a random number table. From each equal subdivision take so selected an equal number of logs at random during unloading or stacking. Collect a number of logs be sufficient to produce at least twice the amount of sawdust or raspings required for the moisture content test and the chemical analyses desired. Reduce the amount of material obtained by sampling to the amount necessary for analysis by quartering (see TAPPI T 605 "Reducing a Gross Sample of Granular or Aggregate Material to Testing Size").

5.1.3 Take subsamples of chips using a shovel or scoop after identifying subdivisions of the lot in the same way as for logs.

5.1.4 An engineered sampling plan requires accepting broad assumptions regarding the relative unimportance of, or the lack of, differences in variation between and within subdivisions of the lot. It avoids questions regarding the limits of uncertainty in the decision made based on the sample, and it provides no real control over that uncertainty. It does not ensure a least-cost balance of sampling against the risk of economic loss due to a bad determination.

5.2 *Probability sampling plan*

5.2.1 If the lot can be assumed to be homogeneous and a prior estimate of the standard deviation of the lot (derived from subsampling) is available, calculate the number of subsamples (n) by