

# Paper for Recycling Quality Control

## GUIDELINES



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# Introduction

The European Standard EN 643, European list of standard grades of paper and board for recycling, is the basic document to be used by industry professionals in the buying and selling of paper for recycling. Interested parties should order the EN 643 from their respective national standardisation body<sup>1</sup>. The standard was revised in 2013 and published in February 2014. It defines what the different grades of paper for recycling can and cannot contain as well as defining prohibited materials and unwanted materials. It also sets maximum tolerance levels by grade for unwanted materials.

Specific agreements between buyer and supplier for grades with special specifications might still be necessary to meet individual requirements. However, general recommendations are needed to facilitate a common understanding of the standard.

To achieve greater harmonisation, to improve the implementation of the EN 643 Standard and to facilitate commercial relationships between paper mills and paper for recycling suppliers, these guidelines contain recommendations regarding paper for recycling quality controls for paper for recycling suppliers and paper mills.

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<sup>1</sup> [www.cen.eu](http://www.cen.eu)

# Guidelines

## **1) Description of the procedure of mutual agreement, standard terms and conditions (including baling and transport conditions) should be indicated as part of the general conditions for supplier approval.**

- A description of the procedure of mutual agreement should be made. If both parties agree, an external audit may be ordered to support the procedure of mutual agreement.
- Reference to ISO should be made when the paper for recycling supplier or paper mill holds a certificate. ISO or equivalent schemes or certificates are recommended.
- Baling conditions should be clearly defined and mentioned to the supplier by the buyer.
- Transport:
  - minimum tonnage by delivery
  - transport conditions
  - compliance with time schedule as agreed by both parties
  - safety

## **2) Training and education for employees from both sides with common background should be recommended. Quality controllers should be independent from the commercial department.**

## **3) Reference to the EN 643 Standard should be made by the contractors.**

- The EN 643 Standard gives a general description of the standard grades by defining what they do and do not contain.
- Reference to the EN 643 Standard should be clearly made in each contract with regards to the classification of paper for recycling.
- The EN 643 Standard is for use by industry professionals, organisations and individuals with an interest in the paper for recycling sector to assist in the buying and selling of this raw material intended for recycling by the paper and board industry.
- It is not the purpose to specify all the qualities of paper and board for recycling that exist in the different markets, but rather to define those qualities most commonly traded in Europe. The description of the grades is brief, and for this reason it is recognised that specific agreements between buyer and supplier for grades with special specifications may be necessary to meet individual requirements.

## **4) Paper for recycling buyers and suppliers should be aware of the quality control procedures and system used by the paper for recycling supplier and the paper mill before the first contract is signed between them.**

- A description of the paper for recycling quality control procedures and system installed and operated by the paper for recycling supplier should be given by the supplier to the buyer before the first contract is signed between them. Any substantial modification (a new test for instance) should be communicated to the buyer.
- A description of the paper for recycling quality control procedures and systems installed and operating at the paper mill should be given by the buyer to the supplier before the first

contract is signed between them. Any substantial modification (a new test for instance) should be communicated to the supplier.

## **5) Information should be given through a delivery document by the suppliers to the buyers for every delivery to the paper mill.**

- One delivery document has to be established per load and a copy has to be given to the paper mill.
- The delivery document must as a minimum include:
  - The information needed to meet all European and National legal requirements associated with the movement and delivery of the material.
  - The identification of the contract partner, with an identification number (if it exists) or a name
  - If applicable, the supplier code according to the European Recovered Paper Identification System
  - The identification of the trailer
  - The delivered grade: numerical code according to the EN 643. Special "mill grades" are possible.
  - The weight
  - The number of bales or bulk
- Paper mills may ask for a declaration from the supplier about the origin of the material in relation to the EN 643 Standard.

## **6) Definition of Quality Control**

### **6.1. By the paper for recycling suppliers**

Visual controls and use of calibrated weighbridge should be considered as a minimum. However it is recommended that further consideration should be given to introducing objective measurement in line with the quality controls at the paper mills below. Results of the quality controls made at the paper mills and by the paper for recycling suppliers can be available on request on a reciprocity basis.

### **6.2. At paper mills**

Quality Control consists of checking at least the following parameters that define the quality of the paper for recycling received in a load delivered to a paper mill:

- the grade as described in EN 643;
- the bale condition (if it is delivered in bales);
- the moisture content, and;
- the unwanted materials content.

There should always be an inspection which starts with an assessment that the load delivered is the correct EN 643 grade as ordered and the presentation of the load is safe to enter the mill. The principal condition for the global inspection procedure is that inspection must be consistent with all loads checked upon arrival at the mill. The global inspection procedure includes visual inspection and, where possible, other objective measurements. Visual inspection consists of a visual evaluation of all loads by experienced staff.

### **6.3. Grades covered**

The procedures referred to in the following paragraphs apply to all grades of paper for recycling and board, as described in EN 643 – European List of Standard Grades of Paper and Board for recycling.

## 6.4. Inspection procedure (see p.12)

Definition of the parameters to be checked:

- **The delivery meets the grade as described in EN 643**

All loads should have the EN 643 grade clearly marked on the delivery document.

- **Bale condition**

The quality of the bales delivered should be evaluated according to the following criteria:

- Parallel wires highly recommended, loose wires are not allowed;
- Density, form, size, weight and any other parameters requested by the mill.
- Bale identification according to the European Recovered Paper Identification System

- **Moisture content**

Moisture content is defined in EN 643: "Paper for recycling and board will, in principle, be supplied with moisture of not more than the naturally occurring level of 10%". Where the moisture content is higher than 10 % (of air dried weight), the additional weight in excess of 10 % may be claimed back – with the method of testing and sampling to be agreed between buyer and seller.

- **Unwanted materials**

Unwanted materials are defined in EN 643 as follows:

- Non-paper components;
- Paper and board not according to grade description
- Paper and board detrimental to production.
- Paper not suitable for deinking (if applicable).

- **Further parameters**

Other parameters may be checked such as age, odour, wetness and/or dirty paper, mould growth and any other limiting parameters set by the mill.

- **Procedure**

The **first step** and the **visual control**, as described below, should be considered as the minimum action to be carried out by the mill. The second step is highly recommended.

### 6.4.1. First step: general control

The aim of the general control is to decide on the acceptance, conditional acceptance or refusal of the load. Conditions of acceptance and rejection of the load should be harmonised at European level.

- Mills can reject loads supplied when the delivery documentation is incorrect.
  - If the grade supplied is not suitable for the mill, the load will be refused.
- The purpose of the first visual inspection is to make an initial assessment of the load's suitability for acceptance. Additional checks or tests may follow.

- This visual inspection leads to acceptance, conditional acceptance or refusal.
  - Conditional acceptance implies that the paper for recycling will have additional controls.
  - A load can be entirely or partially refused / accepted.
- The specific parameters that constitute a refusal are stated by the paper mill to the supplier.

## **6.4.2. Specific Guidelines for baling conditions, control of moisture content and content of unwanted material**

### **6.4.2.1. Guidelines on the control of baling conditions**

Bales must be made in such a way that they can be handled, transported and stored in a safe and cost-efficient manner in the mill. Right-angled and well-pressed bales with parallel wires are highly recommended.

The use of the European Recovered Paper Identification System is recommended. The letters and figures of the codes have to be marked on the surface of the bales e.g. by spraying, painting, attached paper labels, etc. The substances used must comply with the article 3 of Regulation 1935/2004/EC (food contact) and must not be detrimental to the recyclability of the paper for recycling.

Upon reception at the mill, mill staff will check:

- If the lorry is coming with a delivery note of the final supplier
- If there is all the information needed in the delivery note
- If the mark on the bales is the one assigned to this supplier
- If the quality corresponds to the EN643 grade marked (where applicable)

Some minimum requirements regarding the baling conditions should be respected.

#### ***Minimum bale requirements:***

Minimum weight of a bale: 400 kg

1st category: "Medium Bales"

Dimensions of the bales:

- Length: between 1m and 1.50m
- Height and width: between 0.75m and 1.25m
- Weight: from 400 kg to 800 kg

2nd category: "Big Bales"

Dimensions of the bales:

- Length: between 1m and 2.50m
- Height and width: between 0.75m and 1.25m
- Weight: from 700 kg and more

The optimum weight to be loaded on each truck should be the maximum legally permitted.

\* specific modifications may be agreed between the supplier and the paper mill

#### ***Effects of the inspection results***

Three results are possible:

- The quality of the bale condition is satisfactory and acceptable: acceptance without remarks.

- The quality of the bale condition is unsatisfactory but acceptable: acceptance with remarks; the supplier should be informed every time this occurs.
- The quality of the bale condition is unsatisfactory and unacceptable: the paper for recycling will be refused.

\* When non-conforming material is found, corrective action should be agreed between the buyer and the supplier.

### 6.4.2.2. Guidelines for the moisture control of paper for recycling

#### Definition of moisture content

- The definition for moisture content is the one stated in the EN 643:

“Paper and board for recycling will, in principle, be supplied with moisture of not more than the naturally occurring level. Where the moisture content is higher than 10% (of air dried weight), the additional weight in excess of 10% may be claimed back – with the method of testing and sampling to be agreed between buyer and seller”.

#### Control procedure

- Control should be made systematically and every load should be examined.
- Testing should be done for all loads.
- The same number of bales (in case of bales), chosen at random, should be tested from each load.
- If testing is not done for all loads, but a significant content of moisture is visually detected in a load, moisture measurement should be made, even if it was not planned.

#### Measurement

The first step consists of an evaluation of the moisture content by visual inspection. INGEDE method 7 recommends the following for the visual inspection of moisture: “At five representative spots distributed as evenly as possible along the sides of the pile of unloaded recovered paper, moisture tests are to be carried out which are able to detect potential conspicuous moistening. In case of excessive moistening, the moisture content should be measured.”

The result of the visual inspection might lead to the acceptance of the load without further inspection, a conditional acceptance or refusal depending on a gravimetric inspection or technical measurement. Visual inspection alone can only lead to the acceptance or non-acceptance of the material. Conditionally accepted material should be measured with the following objective procedures and devices:

#### ***For bales:***

Measurement can be done through several methods:

- By opening chosen bales. At least one sample should be taken from the load and oven-dried.
- By taking at least one sample of the load by core-drilling devices. The sample should then be oven-dried.
- By technical measurement such as electromagnetic devices, Near Infrared (NIR) scanners and microwave solutions (see annex).

#### ***For loose material:***

- By a gravimetric method: A gravimetric method consists of evaluating the moisture content present in a sample. The sampling method is described in INGEDE method 7.
- By technical measurement. There are several devices on the market to measure the moisture content including for loose material. It is highly recommended to use devices that are recognised by technical institutes. Technical devices are widely and increasingly used by the industry (e.g. electromagnetic devices, Near Infrared (NIR) scanners, microwave solutions). A regular calibration should take place following the recommendations of the device manufacturers to be assured of the correct functioning of these devices.

***Impact of the inspection results:***

- Under 10% of moisture content, the load is accepted.
- Over 10% of moisture content and below maximum tolerance, the difference between the content measured and 10% will be discounted as a percentage of the weight of the load and the cost of transport for ex-works purchasing.
- Over maximum tolerance<sup>2</sup>, the load is rejected.

***Information to suppliers:***

- If a load is refused because the moisture content is too high, the decision should be communicated directly to the supplier.
- Results should be communicated to suppliers on a regular basis.
- When non-conforming material is found, corrective action should be agreed between the buyer and the supplier.

***Database:***

- The moisture content of the loads is one of the main criteria when mills evaluate their suppliers.
- Inspection results should be documented with the information about the load, the grade and the supplier. The result must be filed in order to help the evaluation of suppliers.

### **6.4.2.3. Guidelines for the control of unwanted materials**

**Definition of Unwanted Materials**

- The definition for unwanted materials is the one stated in the EN 643
- The elements to be controlled are non-paper components, paper and board not according to grade description, paper and board detrimental to production and paper not suitable for deinking (if applicable).

**Control Procedure**

The aim of this procedure is to evaluate the proportion of unwanted materials in a load paper for recycling delivered to the paper mills.

- Testing should be done for all loads.
- The same number of bales, chosen at random, should be taken from each load.

**First step: visual inspection (obligatory minimum)**

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<sup>2</sup> Maximum tolerance is to be defined between the buyer and the seller



This procedure defines the minimum control to be carried out by the mill:

- It consists of an evaluation of the unwanted material content by visual inspection. The result of the visual inspection might lead, without further inspection, to acceptance or refusal of the load. Some further inspection might be needed (see second step) and lead to conditional acceptance;
- If a significant presence of unwanted materials is visually detected in a load, and if this load has not been refused, the inspection by measurement of the unwanted materials should be done, even if it was not planned;
- The visual measurement should be supported with statistical methods. This method should be agreed upon between suppliers and buyers in order to be effective.

### **Second step: advanced visual inspection and/or gravimetric method**

- This procedure defines an additional examination (advanced visual inspection and/or gravimetric method) to be carried out by mills further to the visual inspection, which could lead to conditional acceptance.

### **The advanced visual inspection**

- Regarding Deinking grades of paper for recycling, INGEDE detailed the advanced visual inspection (methods 7 & 8):
  - For 1.11.00 (INGEDE method 7 for loose material):  
This method describes the recommendations for an advanced entry inspection and the whole procedure of entry inspection with several quality parameters to be checked: (general condition of the delivery, odour, mouldy and rotting, moisture, delivery presentation, age as well as Paper for Recycling composition. It describes also how to check the visual assessment results and to make a good calibration;
  - For 1.06 (including subgrades), 1.09.00, 1.11.00 and 2.01.00 (INGEDE method 8 for bales in addition to method 7):  
This method describes how to prepare the load for the entry inspection and gives recommendations on the sampling from the bales. The following quality parameters are to be analysed; (general condition of the delivery, odour, mouldy and rotting, moisture, age as well as Paper for Recycling composition) - proportion of various wanted and unwanted materials.

The gravimetric method/sample weighing

- It consists of weighing the quantity of unwanted materials present in a sample;
- There is no standardised method for the time being for all grades but it is recommended to always take the same representative sample and at least one sample from the load. For graphic paper grades INGEDE provides the INGEDE method 14 for sampling and the determination of the composition. For baled material also method 8 describes the sampling. A core-drilling device can be used to get a good sample from bales;
- A quantitative measurement of the unwanted material content is made from the sample taken. The unwanted materials obtained have then to be weighed and its proportion calculated as a percentage of the weight of the full sample taken..

### **Technical solutions**

- Technical solutions are available on the market and increasingly used to measure the content of unwanted materials (e.g. Near Infrared (NIR) scanners for non-paper components). A regular calibration should take place following the recommendations of the device manufacturers to be assured of the correct functioning of these devices.

### **Effects of the inspection results**

- The EN 643 Standard establishes maximum tolerance levels for non-paper components defined by grade.
- The EN 643 Standard also establishes tolerance levels for total unwanted material defined by grade.
- It also establishes that excess of the tolerance levels lead to non-standard grades of paper for recycling.
- Buyer and seller should agree on the consequences of an excess against the EN 643 maximum tolerance levels (refusal or regrading).
- In case of an agreement between the two parties on a re-grading, the measurement result should be in principle, completely applied as a reduction of the weight of the load, the transport cost for ex-work prices and the disposal costs to the mill associated with the unwanted materials;
- Cost inherent to the taking back of the products, or if necessary their elimination, as well as the transport cost, should be the supplier's responsibility.

#### ***Information to Suppliers***

- If a load is refused because the unwanted material content is too high, the decision should be communicated directly to the supplier.
- If the content of unwanted materials leads to a regrading, the result of the control should be communicated directly to the supplier.
- Results should be communicated to suppliers on a regular basis.
- When non-conforming material is found, corrective action should be agreed between the buyer and the supplier.

#### ***Database***

- Unwanted materials content of the loads is one of the main criteria when mills evaluate their suppliers.
- Inspection results must be documented with the information about the load, the grade and the supplier. The result must be filed in order to help the evaluation of suppliers.

#### **6.4.3. Further parameters**

Further inspection to measure other characteristics of the paper for recycling delivered against the delivery document, the EN 643 specifications or the agreed specifications between the paper mill and the supplier will be undertaken.

## **7) Information to suppliers**

- If a load is refused, the decision should be communicated directly to the supplier, as agreed between the two partners.
- If the load is re-graded or if there is a change in price or weight, the decision should be communicated directly to the supplier.
- In general, results should be communicated to the supplier on a regular basis.

### ***Database***

- All relevant information in addition to grade and volume on the paper for recycling delivered by the supplier should be recorded in a database.
- Inspection results must be documented with the information about the load, the grade and the supplier. The result must be filed in order to help the evaluation of suppliers.

### ***Evaluation of the supplier***

- The supplier should be evaluated on a regular basis.
- The bale condition, moisture content, unwanted materials content and the comparison between what has been announced in the delivery note and what has actually been supplied are the main criteria of a supplier evaluation.

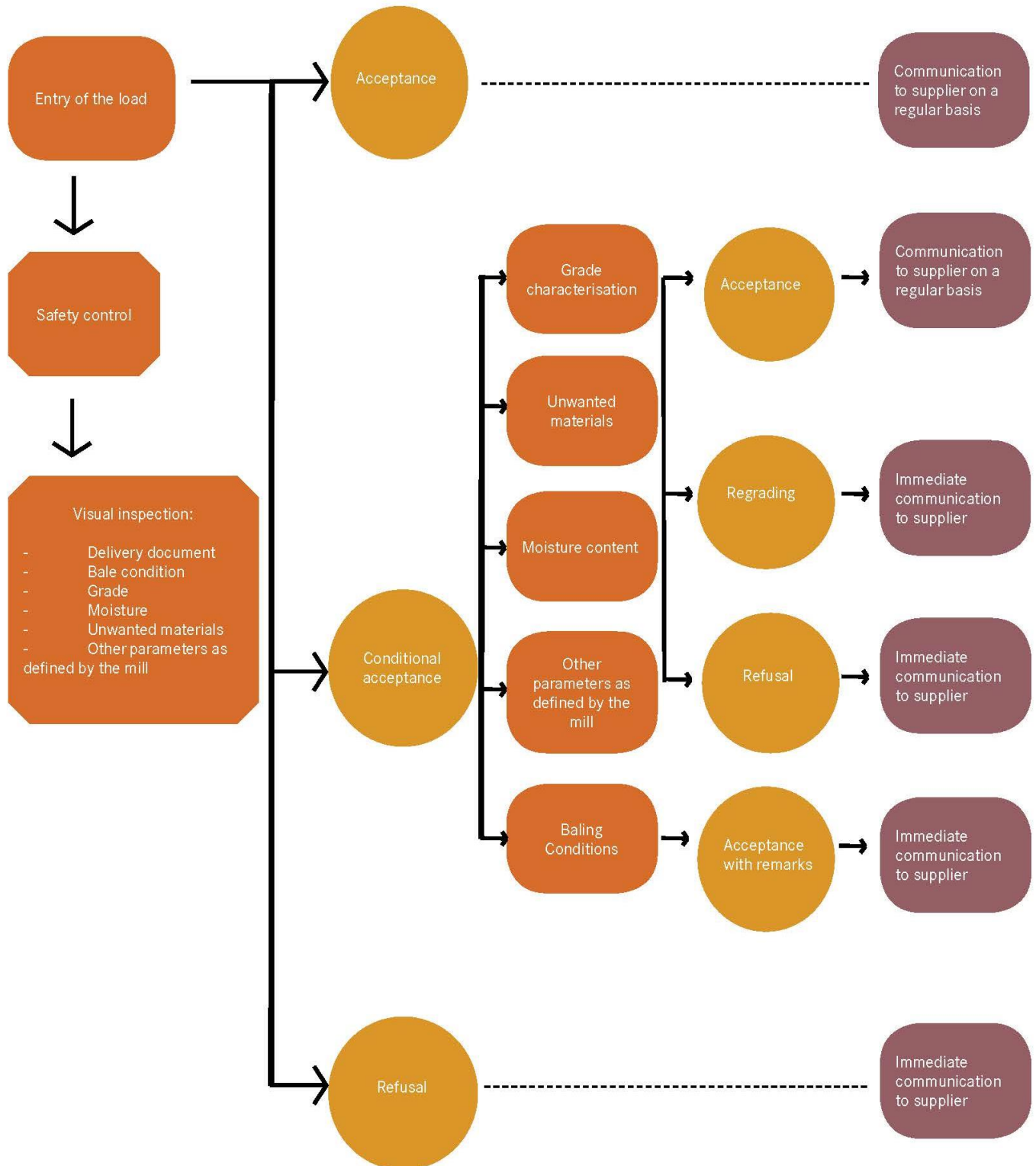
### ***Training***

- Each mill should establish a training period before considering new staff to be in charge of visual control, which consists of an evaluation by experience with as many objective criteria as possible.
- During the training period, new staff should be supported by experienced staff in order to get a full understanding of as much objective criteria as possible to evaluate Paper for Recycling quality.
- Gaining experience in a supplier's depot is recommended.
- General methods of training should be developed.

**8) The procedure to solve conflicts and reach a global acceptance of the results by both sides should be settled between the individuals according to their own agreements.**

**9) The conditions and the limits of the ownership of the paper for recycling and the responsibility for the materials delivered should be clearly established between the supplier and the buyer.**

# Illustration of the Quality Control Procedure



## **Annex: Technical Measurement:**

The market for technical measurement is developing as technical devices are widely and increasingly used by the industry both for baled and loose material. Several devices are already on the market. It is highly recommended to use devices that are recognized by technical institutes. A regular calibration by comparison with the gravimetric method referring to ISO 287 should take place and the recommendations of the device manufacturers should be followed to be assured of the correct functioning of these devices.

In the following, examples of currently existing technical equipment are described:

### 1. Instrumental analysis via automatic sensor Near Infra-Red (NIR)

This system is found to be valid for the analysis of the moisture content and plastic content. Additionally, it can also be used for other necessary measures to manage the use of the material in the production process of the paper mill, such as for the analysis of the ash content and lignin. The method is based on the analysis of a PfR sample obtained by a core-drilling device, when it is passing, at a random drill core location and at a constant and controlled speed, in front of a sensor having a transmitter and NIR receptor.

In a similar method, a hole is drilled into the bale and the NIR sensor is introduced to measure directly in the bale.

It is recommended to select 1 bale per full load for the analysis.

### 2. Instrumental analysis via automatic microwave sensor

This system is considered as valid for the analysis of the moisture content.

The method is based on the analysis through the passing at a controlled speed of the transport means on which are loaded the PfR bales, between a transmitter on one side and a microwave receiver placed at the middle of the height of the load.

The analysed sample is equal to a band of about 50 to 200 cm (depending on the device) over the entire cross depth of the load. Several measurements are performed during the load passage. The method allows an analysis that can be reasonably considered as being that of the full load.

For further information, including on providers of technical measurement devices, please contact CEPI at [mail@cepi.org](mailto:mail@cepi.org).



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