FEDERATION EUROPEENNE DE LA MANUTENTION
SECTION II
CONTINUOUS HANDLING

FEM
2 481

PRINCIPAL SPECIAL CHARACTERISTICS OF BULK PRODUCTS TRANSPORTED IN PNEUMATIC CONVEYORS

Definition and determination of the methods of measurement

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SUMMARY

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1 - REFERENCES

This document forms part of document FEM 2 581 "Properties of bulk materials", and is associated with document FEM 2 582 "General properties of bulk materials and their symbolization" (November 1991).

Document FEM 2 421 "Influence of the characteristics of bulk materials on the design of pneumatic handling systems" (January 1992) can then be referred to.

2 - GENERAL

In the case of handling in pneumatic conveyors, further special characteristics are essential for optimum determination of the installations.

These special characteristics are a function of the methods of measurement used.

This document defines the methods of measurement making it possible to obtain comparable, reproducible values.

3 - TEST REPORT

A pneumatic conveying test should be reported with the following data :

- reference to document FEM 2 481
- name of product
- characterization of product according to FEM 2 582
- origin of sample
- dispatch date
- means of transport to test site
- results
- number of tests
- problems likely to influence the results (e.g. : vibration, ...)
- temperature and atmospheric pressure
- date of test
- name of testing organization (name of firm)
- name of operator
- method of measurement
- date of test report.

4 - TEST CONDITIONS

- Temperature of test room, of measurement apparatus and of product : 18 to 22°C.
- Relative humidity of test room : 40 to 50 %.
- Measurement apparatus shall be in perfect condition, dry and clean.
- The apparatus with a water level gauge shall be set to horizontal.
- If test conditions are different, it must be mentioned in the test report.

Comment : The measurement apparatus described in the present document are designed for powdery and granular materials, the physical properties and diameter of which are compatible with the size of the flow openings. For products which flow poorly or whose particle size is too big, the dimensions of measurement apparatus can be extrapolated from those contained in this document.

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5 - SAMPLING

5.1 Selection of sample

Due to the possible variations in the physical properties of the product depending on its origin, the batch size and the time, the sampling method should all be such that the samples are representative of the material in question.

It is impossible to define a procedure applicable for all products but in most cases we can refer to the normal practices of the profession :

- when sampling is carried out while the bulk products is moving, basic samples shall be taken at intervals determined by the flow speed
- when sampling is carried out from a cone-shaped heap, the heap is divided into 4 sections. Two opposite quarters are taken and homogenized, the operation is repeated until a sample of the desired quantity is obtained
- when sampling is carried out in a hopper, the basic samples shall be taken using cylindrical core samplers, shovels, or powered samplers, according to local practice.

Note : the national standards can be usefully referred to.

In order not to alter its physical properties and to be able to proceed with further examinations, the sample should be placed, without being packed down, in a sealed container, filled right up to the top, so that only the air normally found between the solid particles remains.

If a more explicit definition of the physical properties is required, it is possible to adopt a precise sampling method fixed for one special material.

For example, we could refer to the ISO standard ISO/R 802 - 1976 concerning the sampling of aluminium oxide.

5.2 The sample shall be accompanied by a form on which shall be mentioned :

- reference to document FEM 2 481
- name of product
- specific characteristics of the product (refer to FEM 2 582)
- origin of sample
- date of sample selection
- name of organization which has carried out the selection of sample
- name of operator.

Note 1 : The particle size analysis by sample screening could be carried out according to chapter 6 but it is understood that, only the sample as it was taken remains representative for the determination of product aptitude to be conveyed pneumatically or fluidized. In fact, it may be necessary to treat the product prior to particle size analysis, for example, by drying of the sample. This treatment may alter the product's properties whose particles may either desintegrate or agglomerate during the operation.

Note 2 Transport test : If, in addition to the measurements of the product's physical properties, a test intended to judge the product's handling possibilities is considered, an adequate sample must be available in sealed containers.