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## CEMA STANDARD 550

# CLASSIFICATION AND DEFINITIONS OF BULK MATERIALS

CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION

# CLASSIFICATION & DEFINITIONS OF BULK MATERIALS

## FOREWORD

The CEMA Engineering Conference recognizes that the basis of all bulk material conveyor engineering is the precise definition and accurate classification of materials according to their individual handling characteristics under a specific combination of conditions of temperature, humidity, sizes and distribution of lumps, friability, and so on, including all factors that influence the selection of proper types and sizes of conveyors, horizontal, inclined or vertical.

This exacting task of cataloging bulk materials was assigned by the Conference to the CEMA Committee for Materials Classification & Definition, a task that was greatly magnified by the increasing flow of new materials from the world's geometrically expanding technology in all fields and the alteration of older materials into forms with different handling characteristics.

This task can, therefore, never be considered as having been completed. The Committee fully realizes that its conclusions at the time of any publication represents only that part of the work that has been completed to date.

For that reason, it is the earnest recommendation of the members of the Conveyor Equipment Manufacturers Association that competent engineering and technological assistance be sought whenever there is the slightest doubt as to how any material will behave under specific conditions.

It is desirable and necessary that materials and conditions be described precisely and completely whenever equipment manufacturers and consulting engineers are called in to make recommendations.

*Prepared as a service to the industry by the CEMA Bulk Handling Section*

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REFERENCED
CHANGES

## SUMMARY OF CHANGES IN THIS EDITION

***This 2003 Edition updates, Chapter 1, Table 2, "Comparison of U.S. Standard Sieves and Tyler Sieves".***

***The updated table has been renamed "Comparison of U.S., ISO, and Tyler Standard Sieves". It incorporates ISO Sieve desigations as well as the current U.S. measurement changes to accommodate ISO Standard 133. These changes are also reflected in changes to Table 6 "Average Size System from Screen Analysis".***

***This Edition includes a more readable version of Chapter 2, Figure 9, "CEMA Size Code Classes vs Particle Size - Inches."***

***This Edition updates, Chapter 3, "The Material Table".***

***The updated table amalgamates virtually all of the CEMA Material Handling Characteristics Data that the Association has available and has published in its two other documents which deal with material handling characteristics; Belt Conveyors for Bulk Materials and CEMA Book 350: Screw Conveyors.***

***To keep this document updated, and of maximum utility to the industry, we welcome, and are prepared to consider for inclusion in future editions, new material and characterizations submitted to us from any members of the bulk material conveying industry.***

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**Bulk Handling Section**
**of the**
**CEMA Engineering Conference**

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# CHAPTER I

**Terminology: Definitions, Test Procedures or Examples**

This chapter is devoted to establishing consistent terminology for the various properties and characteristics of bulk materials that are considered to affect conveyability or design in the proper selection of materials handling equipment. Definitions are given and test procedures are established where practicable.

Two general classes are established. The first class is “Physical Characteristics” and includes those properties that can generally be physically tested and numerical values determined. These carry an “A” prefix. The second class is “Hazards Affecting Conveyability.” This latter group is more difficult to test and determine quantitative results. They carry a “B” prefix. Where possible, suggested test procedures are given to determine a qualitative, generally yes or no, answer. Typical examples of materials having the particular property being described are given to facilitate a better understanding of the characteristic involved.

If a given material sample is analyzed for all thirty-seven characteristics given in the following pages, much more will be known about the material than generally found heretofore and the problem of proper equipment selection for the application will be made easier. A classification coding system is established in Chapter II and a suggested format for listing these characteristics is contained in Chapter III.

## 1. PHYSICAL CHARACTERISTICS

### A-I Abrasiveness

Definition: Abrasiveness is a combination of the physical characteristics of a material that enables it to abrade particles from surfaces with which it comes into moving contact.
Test: It seems from observations that the following 4 characteristics are those which would contribute to the abrasive character of a material.

(1) Particle hardness (See A-16)
(2) Particle shape (See B-17)
(3) Bulk Material Density (See A-8)
(4) Size (See A-17 & A-18)

The following factors are assigned to each of the above characteristics:

**Hardness**

| **Mohs No.** | **Factor** |
|---|---|
| I | 1 |
| 2 | 4 |
| 3 | 9 |
| 4 | 16 |
| 5 | 25 |
| 6 | 36 |
| 7 | 49 |
| 8 | 64 |
| 9 | 81 |
| 10 | 100 |