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Solid mineral fuels -- Vocabulary -- Part 1: Terms relating to coal preparation

Combustibles minéraux solides -- Vocabulaire -- Partie 1: Termes relatifs à la préparation du charbon

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INTERNATIONAL STANDARD

ISO
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Second edition
1993-12-01

Solid mineral fuels – Vocabulary –

Part 1:

Terms relating to coal preparation

Combustibles minéraux solides – Vocabulaire –
(standards.iteh.ai)

Partie 1: Termes relatifs à la préparation du charbon

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Reference number
ISO 1213-1:1993 (E)

ISO 1213-1:1993 (E)**Foreword**

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 1213-1 was prepared by Technical Committee ISO/TC 27, *Solid mineral fuels*, Sub-Committee SC 1, *Coal preparation, terminology and performance*.

This second edition cancels and replaces the first edition (ISO 1213-1:1982), of which it constitutes a technical revision.

ISO 1213 consists of the following parts, under the general title *Solid mineral fuels – Vocabulary*

- *Part 1: Terms relating to coal preparation*
- *Part 2: Terms relating to sampling testing and analysis.*

Annex A of this part of ISO 1213 is for information only.

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Introduction

This part of ISO 1213 is a glossary consisting of a systematic list of terms commonly employed in coal preparation.

For terms relating to petrographic analysis, see ISO 7404-1:1984, *Methods for the petrographic analysis of bituminous coal and anthracite – Part 1: Glossary of terms*.

This part of ISO 1213 takes into account the distinction between processes or operations and the methods or machines for carrying them out.

Clause 3 is devoted primarily to coal properties and the principal operations involved in coal preparation, and also includes general terms such as those relating to capacities and flowsheets.

Clauses 4 to 7 cover the detailed terminology relating to sizing, cleaning, separation of solids from water or air, and size reduction.

Clause 8 deals with the terms involved in interpreting or expressing the results of coal preparation operations.

Clause 9 includes some miscellaneous terms.

Clause 10 covers terms related to blending and homogenization.

Clause 11 covers terms related to automatic control. Of necessity, it covers only a limited selection of terms. A list of other International Standards, which together provide a more comprehensive set of terms, is given in annex A.

Most of the clauses are subdivided, and in each case the first subclause includes general terms and the remaining subclauses cover groups of related terms. As far as possible, this logical principle has been carried through into the arrangement of the terms themselves, which are also numbered for ease of reference. An alphabetical index is also provided, with a numerical cross-reference.

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Solid mineral fuels – Vocabulary –

Part 1: Terms relating to coal preparation

1 Scope

This part of ISO 1213 defines terms commonly employed in coal preparation

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 1213. At the time of publication, the edition indicated was valid. All standards are subject to revision and parties to agreements based on this part of ISO 1213 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 10753:–1¹⁾, *Coal preparation plant – Assessment of the liability to breakdown in water of materials associated with coal seams.*

3 General

3.1 General coal preparation terms

3.1.01 coal preparation: Collectively, physical and mechanical processes applied to coal to make it suitable for a particular use.

3.1.02 run of mine; r.o.m. coal: Coal produced by mining operations, before screening, crushing or preparation.

3.1.03 raw coal: Coal that has received no preparation other than possibly screening or crushing.

3.1.04 raw coal feed: Raw coal supplied to a plant or machine, in which it undergoes some form of preparation.

3.1.05 coal cleaning: The treatment of raw coal to lower the quantity of undesirable constituents, through the difference in either density or surface properties

3.1.06 cleaned coal; clean coal: Coal produced by a cleaning process (wet or dry).

3.1.07 middlings: A product of coal preparation that, because of its ash percentage, is intermediate between coal and discard.

NOTE 1 It follows therefore that the relative density of middlings is intermediate between those of coal and discard. Middlings may be reprocessed.

3.1.08 true middlings; bone: Middlings so nearly homogeneous that their quality cannot readily be improved by crushing and recleaning.

3.1.09 false middlings; interbanded middlings: Middlings in which the particles consist of bands of coal and shale, and from which the coal may be liberated by crushing.

3.1.10 reject; refuse: The material extracted from the feed during cleaning, for retreatment or discard.

3.1.11 discard; dirt; stone: The material extracted from the raw coal and finally discarded.

3.1.12 recirculation: The operation in which the whole or part of a product from a process is returned to the feed to a process, e.g. the return of the crushed overflow from a screen to the screen feed for rescreening.

3.1.13 "foreign coal": Coal received at a preparation plant from a source other than that to which the plant is attached.

3.1.14 imported coal: Coal coming from a foreign country, or other state within the country.

3.1.15 low-grade coal: Combustible material that has only limited uses owing to undesirable characteristics (e.g. ash percentage or size).

3.1.16 segregation: Partial separation of a material into its constituents, occurring as a result of differences in particle characteristics such as particle size or relative density.

1) To be published.

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3.2 Cleaning characteristics

3.2.01 washability: The amenability of a coal to improvement in quality by cleaning, generally through its relative density/ash relationship.

3.2.02 float-and-sink analysis: The division of a sample into relative density fractions having defined limits, the amounts of the fractions being expressed as percentages of the total sample, commonly with an indication of the ash percentage (and other characteristics, if required) of each fraction.

3.2.03 washability curve: Any curve obtained from the results of a float-and-sink analysis permitting the theoretical yield of floats or sinks to be read off.

NOTE 2 The following are the five main types of washability curves:

- the characteristic ash curve;
- the cumulative floats curve;
- the cumulative sinks curve;
- the densimetric (relative density) curve;
- the near-density curve.

3.2.04 characteristic ash curve: The curve obtained from the results of a float-and-sink analysis showing, for any mass percentage of floats (or sinks) the ash percentage of the highest density (or lowest density) fraction passing into these floats (or sinks), the mass percentage being plotted on the ordinate (vertical axis) and the ash percentage on the abscissa (horizontal axis).

3.2.05 cumulative curve: Any curve expressing the results of combining successive relative density fractions or size fractions.

3.2.06 cumulative floats curve: The curve obtained from the results of a float-and-sink analysis by plotting the cumulative mass percentage of floats at each relative density against the cumulative ash of the total floats at that density.

3.2.07 cumulative sinks curve: The curve obtained from the results of a float-and-sink analysis by plotting the cumulative mass percentage of sinks at each relative density against the cumulative ash of the total sinks at that density.

3.2.08 densimetric curve; relative density curve: The curve obtained from the results of a float-and-sink analysis by plotting the cumulative mass percentage of floats or sinks against the relative density.

3.2.09 near-density curve; difficulty curve: The curve obtained from the results of a float-and-sink analysis, or from the densimetric curve, by plotting the mass percentage within the limits $\pm 0,1$ of a given relative density against that relative density.

3.2.10 performance curve: Any curve used to show the relationship between properties of coal and results of a specific treatment.

3.2.11 actual performance curve: A performance curve showing the results actually obtained from a coal preparation treatment.

3.2.12 expected performance curve: A performance curve showing the expected results of a coal preparation treatment.

3.2.13 M-curve; Mayer curve: A vectorial curve, obtained by plotting the cumulative ash percentages against their cumulative yields, used to express the washability of a coal, plotted on a vectorial diagram in which the projection of the vector on the ordinate (vertical axis) represents the percentage of the product (coal) and the direction of the vector represents the percentage of a particular constituent of the product.

3.2.14 ash/relative density curve: The curve obtained from the float-and-sink analysis by plotting the ash percentages of successive fractions against the mean relative density of the fraction.

3.3 Capacity and throughput

3.3.01 nominal capacity: A notional figure, expressed in mass per hour, used in the title of a flowsheet and in the general description of a plant, applying to the plant as a whole and to the specific product under consideration.

3.3.02 operational capacities: Figures given on a flowsheet to indicate quantities per unit time passing various points in the plant, taking account of fluctuations in the rate of supply and composition (as to size and impurity content).

3.3.03 design capacity: The rate of feed at which specific items of plant must operate continuously and give the guaranteed results on a particular quality of feed.

3.3.04 peak design capacity: A rate of feed in excess of the design capacity that specific items of plant will accept for short periods without necessarily fulfilling the performance guarantees given in respect of them.

3.3.05 mechanical maximum capacity: The highest rate of feed at which specific items of equipment, not subject to performance guarantees, will function on the type and quality of feed for which they are supplied.

3.3.06 feed: Material for treatment supplied to an appliance or plant.

3.3.07 basic flowsheet: A schematic diagram representing the various preparation process stages in the treatment of the raw coal.

3.3.08 process flowsheet: A basic flowsheet indicating the main operational steps within the plant, the movement of the various materials between the steps and the final products obtained, and often also the average mass flow at various points in the plant.

3.3.09 equipment flowsheet: A diagram indicating, by standard symbols, the units of equipment used in the various operational steps carried out within a coal preparation plant.

3.3.10 materials flowsheet: A flowsheet principally concerned with solid materials.

3.3.11 liquids flowsheet: A flowsheet to indicate the flow of liquids throughout a series of operations.

3.3.12 weighted flowsheet; capacity flowsheet: A materials flowsheet used in the design of a plant, including statements of the mass flow per hour at principal points in the plant.

4 Sizing

4.1 General

4.1.01 sizing: Division of a material into products between nominal size limits.

4.1.02 classification: The separation of particles according to their size, density and shape by control of their settling rate through a fluid medium.

4.1.03 size analysis: The process or the result of the division of a sample into size fractions, each within defined limits, the mass or number of particles in each fraction being expressed as percentages of the total sample.

4.1.04 sieve analysis: Size analysis in which the division is carried out by the use of test sieves.

4.1.05 mean size: The weighted average particle size of any sample, batch or consignment of particulate material.

NOTE 3 Several bases for calculating mean size have been proposed, giving results that vary widely for the same size distribution. The method of calculation should, therefore, always be stated whenever results are reported.

4.1.06 nominal size; limiting size: The limit or limits of particle size used to describe a product of a sizing operation.

4.1.07 oversize: Material in a product of size greater than the upper nominal size limit; may be expressed as a percentage of the product.

4.1.08 undersize: Material in a product of size smaller than the lower nominal size limit; may be expressed as a percentage of the product.

4.1.09 dust: Particles of solid material sufficiently fine to allow suspension in air. (See also 6.4.)

4.1.10 fines: Coal having a maximum particle size usually less than 4 mm, and having no lower limit.

NOTE 4 The upper limit may vary widely. To avoid confusion, the term should always be qualified by stating the nominal size.

4.1.11 smalls: Coal having a maximum particle size usually less than 25 mm, and having no lower limit.

NOTE 5 The upper limit may vary widely. To avoid confusion, the term should always be qualified by stating the nominal size.

4.2 Screening

4.2.01 screening: The separation of solid materials of different sizes, by causing part to remain on a surface provided with apertures through which the remainder passes.

4.2.02 screen:

- (1) A device for carrying out the operation of screening.
- (2) A commonly used abbreviation for screen deck or screening surface, e.g. woven-wire screen.

4.2.03 amplitude: The maximum displacement from the mean position in an oscillating motion.

NOTE 6 In the case of a screen having a straight line motion or elliptical motion, it is half of the total movement or half of the major axis of the ellipse. In the case of a circular motion, it is the radius of the circle.

See also *stroke* (4.2.04).

4.2.04 stroke; throw: The distance between the extreme positions of an oscillating or vibrating motion, i.e. the stroke is equal to twice the amplitude.

4.2.05 aperture size: The dimension or dimensions defining the opening in the screening surface, qualified as to the shape of aperture, e.g. "round-hole", "square-mesh", "long-slot".

4.2.06 dry screening: The screening of solid materials of different sizes without the aid of water.

4.2.07 wet screening: : The screening of solid materials of different sizes with the aid of water.

4.2.08 probability screening: A method of screening that, by making extended use of the probability of a particle passing through an aperture, allows sizing at fine sizes to be performed with relatively large apertures.

4.2.09 desliming: The removal of slimes from coal or a mixture of coal and water, however accomplished.

4.2.10 fines removal: The removal of fine particles from a feed material, by either wet or dry methods, to facilitate treatment or utilization of the remainder.

4.2.11 dedusting: Fines removal by dry methods.

4.2.12 screen overflow: That portion of the feed material discharged from the screen deck without having passed through the apertures.

4.2.13 misplaced undersize: Particles in a screen overflow that are smaller than a reference size.

4.2.14 screen underflow: That portion of the feed material that has passed through the apertures in a screen deck.

4.2.15 misplaced oversize: Particles in a screen underflow that are larger than a reference size.

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4.2.16 misplaced material (screening): Undersize contained in the overflow, or oversize contained in the underflow.

4.2.17 near-mesh material; near-size material: Material approximating in size to a reference size, usually within $\pm 25\%$ of that reference.

4.2.18 nominal area (screen): The total area of the screen deck exposed to the flow of the material feed.

4.2.19 effective area (screen); working area (deprecated): The nominal area less any area occupied by fixings or supports that obstruct the passage of material over or through the screen deck.

4.2.20 open area: The ratio of the total area of the apertures to the total area of the wire cloth, perforated plate or wedge-wire panel, expressed as a percentage.

4.2.21 sieve

(1) Generally, a screen of relatively small area.

(2) Particularly, a screen used for size analysis.

4.3 Parts of screens

4.3.01 screen deck; screening surface: A surface provided with apertures of specified size for carrying out the operation of screening.

4.3.02 screen plate: A plate provided with apertures of specified size and range for use as a screen deck.

4.3.03 screen cloth; screen mesh: A mesh of wires woven in a consistent manner to form the apertures.

4.3.04 wedge-wire deck; wedge-wire sieve: A screen deck, comprising wires of wedge-shaped cross-section spaced from each other at a fixed dimension, in which the underflow passes through an aperture of increasing cross-section.

4.3.05 loose-rod deck: A screening surface consisting of loosely held parallel rods positioned at right angles to the flow of material over the screen.

NOTE 7 Normally, a loose-rod deck is used only on high-speed vibrating screens.

4.3.06 relieving deck: A screen plate having large apertures mounted over the screening deck to reduce the load and wear thereon.

4.4 Screens according to purpose

4.4.01 run-of-mine screen: A screen used for dividing run-of-mine coal into two or more sizes for further treatment or disposal.

NOTE 8 A run-of-mine screen is usually employed to remove the largest pieces for crushing and re-addition to the run-of-mine coal.

4.4.02 primary screen; raw coal screen: A screen used to divide coal (usually raw coal) into sizes more suitable for the subsequent cleaning of some or all of them.

4.4.03 dewatering screen: A screen used for the separation of water from solids.

4.4.04 desliming screen: A screen used for the removal of slimes from larger particles, usually with the aid of water sprays.

4.4.05 slurry screen: A screen used to recover and de-water granular products from circulating water in a coal preparation plant.

4.4.06 rinsing screen; spray screen: A screen used for the removal of fine solids by spraying, especially dense medium solids present among or adhering to larger particles.

4.4.07 sizing screen(s); grading screen(s), classifying screen(s) (deprecated): A screen or set of screens normally used for dividing a product (e.g. clean coal) into a range of sizes.

4.4.08 guard screen; oversize control screen: A screen used to prevent the entry into a machine of coarse particles which can interfere with its operation.

4.4.09 undersize control screen; breakage screen (deprecated): A screen used for the removal or undersize from a product.

4.5 Screens according to principle of construction

4.5.01 single-deck screen: A screen having one screening surface, not necessarily limited to one size or shape of aperture.

4.5.02 multi-deck screen: A screen having two or more superimposed screening surfaces mounted rigidly within a common frame.

4.5.03 jiggling screen; reciprocating screen; shaking screen (deprecated): A screen to which a combined horizontal and vertical motion is imparted, normally by a crankshaft and connecting rod, the screen deck being horizontal or inclined at a small angle.

4.5.04 resonance screen: A screen having a period of oscillation at or very close to the natural period of oscillation of the resilient mounting.

4.5.05 vibrating screen: A screen oscillated at high speed by either mechanical or electrical means.

NOTE 9 The amplitude of movement of the vibrating screen is smaller than that of the jiggling screen, and its frequency of oscillation is higher.

4.5.06 rotating probability screen: A device for probability screening, consisting of a rotating horizontal deck having radial spokes, the separation point being obtained by varying the rotational speed.

4.5.07 trommel screen; revolving screen: A screen in which the screening surface is formed into a cylinder or frustum of a cone, mounted upon a horizontal or near-horizontal rotating shaft, or on revolving rollers.

4.5.08 roll screen: A screen consisting of a number of horizontal rotating shafts, fitted with elements arranged to provide screening apertures.

4.5.09 bar screen: A stationary inclined screen, comprising longitudinal bars, spaced at intervals, onto which the material is fed at the upper end.

4.5.10 grizzly: A rugged screen for rough sizing at comparatively large size (e.g. 150 mm).

NOTE 10 A grizzly can comprise fixed or moving bars, discs, or shaped tumblers or rollers.

4.5.11 sieve bend: A device for the sizing of fine particles suspended in water by means of a stationary curved panel, usually of wedge-wire, the aperture of which is at right angles to the flow of feed, whereby the finer particles are removed with the bulk of the water in the underflow. [See also *fixed screen* (6.2.02).]

4.6 Sizing in a current of air or water

4.6.01 air classification: The process of sizing in a current of air.

4.6.02 classifier: A device that separates particles, according to their size, shape and density, by physical means other than screening.

4.6.03 cyclone classifier: A device for classification by centrifugal means of fine particles suspended in a fluid, whereby the coarser particles are discharged from the apex of the vessel, and the finer particles are removed with the bulk of the fluid at the overflow orifice.

5 Cleaning

5.1 General

5.1.01 dry cleaning: The separation of impurities from coal by manual or mechanical methods that avoid the use of a liquid.

5.1.02 wet cleaning: The mechanical separation of impurities from coal by methods involving the use of a liquid.

5.1.03 washery: A coal preparation plant in which a wet cleaning process is carried out.

5.1.04 reclean; rewash: To re-treat a product in the same or in another plant.

5.1.05 washery products: The final products from a washery.

5.1.06 reject elevator; refuse elevator (deprecated): An elevator for removing and draining the reject from a washing appliance.

5.1.07 middlings elevator: An elevator that removes middlings for further treatment or for disposal as an inferior product.

5.1.08 head tank: A tank or vessel in the water circuit that is used to maintain the delivery pressure of the water by constant level to the washing units.

5.1.09 launder: A trough or channel along which liquids, or a mixture of liquids and solids, flow.

5.1.10 pump sump: A tank into which the process water gravitates and from which it is recirculated by means of a pump.

5.1.11 suspension: A mixture of solid particles and water or air in which the solid particles are completely and individually supported.

5.1.12 teeter (in); fluidized suspension (in): The condition of a suspension of solids in an upward-moving current of water or air, whereby the support given to the particles reduces the internal friction between them to such an extent that the suspension acquires fluid or partially fluid properties.

5.1.13 water circuit: The complete system of pipelines, pumps, sumps, tanks, launders and accessories used for the circulation of water in a washery.

5.1.14 closed water circuit: A water circuit designed so that the only water added is that necessary to replace the loss on the washery products and that due to atmospheric evaporation.

5.1.15 circulating water: The water in the water circuit.

5.1.16 make-up water: Water supplied to a plant to replace that lost from the circuit.

5.1.17 rinsing water; spray water: Water used to remove fine particles from larger sizes.

5.1.18 waste water; surplus water, bleed water (deprecated): Excess water allowed to run to waste from the water circuit. [See also *effluent* (6.1.09 and 6.1.10)].

5.1.19 pit water; mine water: Water from underground workings or an open-cut mine.

5.1.20 slimes: Extremely fine particles in suspension or adhering to larger particles.

5.1.21 slurry (coal preparation): Fine particles concentrated in a portion of the circulating water and water-borne for treatment or disposal.

5.1.22 froth flotation: A process for cleaning fine coal in which the coal, with the aid of a reagent or reagents, becomes attached to air bubbles in a liquid medium and floats as a froth.