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Coal and coke — Vocabulary —

Part 1: Terms relating to coal preparation

Charbon et coke — Vocabulaire —

Partie 1: Termes relatifs à la préparation du charbon

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Foreword

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This document was prepared by Technical Committee ISO/TC 27, *Coal and coke*, Subcommittee SC 1, *Coal preparation: Terminology and performance*.

This third edition cancels and replaces the second edition (ISO 1213-1:1993), which has been technically revised.

A list of all parts in the ISO 1213 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document 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 Bibliography.

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.

Coal and coke — Vocabulary —

Part 1: Terms relating to coal preparation

1 Scope

This document defines terms commonly employed in coal preparation.

Note For terms relating to petrographic analysis, see ISO 7404-1.

2 Normative reference

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 General coal preparation terms

3.1.1
coal preparation
collectively, physical and mechanical processes applied to coal to make it suitable for a particular use

3.1.2
run of mine
r.o.m.
r.o.m. coal
coal produced by mining operations, before screening, *crushing* (7.1.2) or preparation

3.1.3
raw coal
coal that has received no preparation other than possibly *screening* (4.2.1) or *crushing* (7.1.2)

3.1.4
raw coal feed
raw coal (3.1.3) supplied to a plant or machine, in which it undergoes some form of preparation

3.1.5
coal cleaning
treatment of *raw coal* (3.1.3) to lower the quantity of undesirable constituents, through the difference in either density or surface properties

3.1.6
cleaned coal
clean coal
coal produced by a cleaning process (wet or dry)

3.1.7
middlings
product of *coal preparation* (3.1.1) that, because of its ash percentage, is intermediate between coal and *discard* (3.1.11)

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

3.1.8
true middlings
bone
middlings (3.1.7) so nearly homogeneous that their quality cannot readily be improved by *crushing* (7.1.2) and recleaning

3.1.9
false middlings
interbanded middlings
middlings (3.1.7) in which the particles consist of bands of coal and shale, and from which the coal may be liberated by *crushing* (7.1.2)

3.1.10
reject
refuse
material extracted from the *feed* (3.3.6) during cleaning, for retreatment or *discard* (3.1.11)

3.1.11
discard
dirt
stone
material extracted from the *raw coal* (3.1.3) and finally discarded

3.1.12
recirculation
operation in which the whole or part of a product from a process is returned to the *feed* (3.3.6) to a process

Note 1 to entry: For example, 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
part-cleaned coal
mixed product of cleaned and uncleaned fractions of coal

3.1.17
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

3.1.18
beneficiate
to increase the commercial value of a coal by appropriate treatment

3.1.19
coal preparation plant
plant in which a *coal preparation* (3.1.1) process is carried out

3.1.20
compressor air
compressor, either rotary or reciprocating, used to produce air at a pressure suitable for specific operations in the *coal preparation plant* (3.1.19)

3.1.21
concentrate clean coal
cleaned product from a beneficiation process e.g. *froth flotation* (5.1.22)

3.1.22
demagnetise
to promote *dispersion* (6.1.12), by means of a suitable magnetic field, in a *dense medium* (5.4.2) of solids that have been flocculated magnetically

3.1.23
Durham cone
laboratory apparatus used for evaluation of the flow or handling characteristics of coal

3.1.24
flowsheet
diagram indicating the method of treating the *raw coal* (3.1.3) in a preparation plant, by showing in correct sequence the chief units of plant, the principal operations and (normally) the quantities of each stage

3.1.25
haematite
iron oxide mineral, typically forming the non-magnetic component of *industrial magnetite* (3.1.30)

3.1.26
idlers
<conveyor> rollers for supporting a conveyor belt

3.1.27
impact box
container interposed at impact points in the flow of material to resist wear

3.1.28
tramp iron
pieces of magnetic metal, metallic equipment of machine parts, used welding rods that have become accidently mixed with the run-of-mine coal

3.1.29
magnetite
strongly magnetic iron oxide mineral, making up the magnetic component of *industrial magnetite* (3.1.30)

3.1.30
industrial magnetite
commercially available magnetic material used for preparation of *dense medium* (5.4.2) for use in *coal preparation* (3.1.1), commonly referred to as *magnetite* (3.1.29)

3.1.31
metering box
container, having single or multiple compartments, and a *weir* (3.1.44) or weirs to provide the controlled addition of one or more *reagents* (3.1.36)

3.1.32
percentage recovery
amount of a certain constituent in the product, expressed as a percentage of that constituent in the *feed* (3.3.6)

3.1.33
finger planimeter
flow rate indicator for determining the volumetric rate of flow of a solid particulate material, in which a series of flexible steel fingers mounted on a common frame are situated above a conveyor belt with the fingers resting on the belt surface

3.1.34
pilot plant
coal preparation plant (3.1.19) of limited capacity but duplicating the operations of a proposed plant or a part of the proposed plant, so that the effectiveness of the designed process may be determined

3.1.35
metering pump
variable, positive-displacement pump to control the addition of *reagents* (3.1.36) to a *coal preparation plant* (3.1.19) circuit

3.1.36
reagent
chemical substance added to the preparation plant circuit for some specific purpose

3.1.37
residence time
mean time for which a unit of material is within a vessel or process

3.1.38
solids concentration

a) <by mass> mass of solids in a solids/liquid mixture or *suspension* (5.1.11), expressed as a percentage of the total *pulp* (5.6.6) or *slurry* (5.1.21) mass

b) <by volume> volume of solids in a solids/liquid mixture or *suspension* (5.1.11), expressed as a percentage of the total pulp or *slurry* (5.1.21) volume

c) <by other means> mass or volume of solids in a solids/liquid mixture or *suspension* (5.1.11), expressed as a mass per unit volume, or volume per unit mass, of the total *pulp* (5.6.6) or *slurry* (5.1.21) respectively

3.1.39
spigot
orifice of a device [e.g. the apex of a *cyclone* (5.5.8)] through which the underflow discharges

3.1.40
splitter box
receiver fitted with an adjustable device to divert or apportion flow

3.1.41
spoil bank
stockpile of *reject* (3.1.10) material; may also refer to waste material (e.g. overburden) from mining operations

3.1.42
trash
extraneous material associated with the run-of-mine coal, e.g. wood, metal, and plastic materials

3.1.43
belt weigher
apparatus used to quantify the mass flow of a material on a belt conveyor

3.1.44
weir
plate or dam (over which the liquid must flow) to control the level of the liquid

3.2 Cleaning characteristics

3.2.1
washability
amenability of a coal to improvement in quality by cleaning, generally through its relative density/ash relationship

3.2.2
float-and-sink analysis
division of a sample into relative density fractions having defined limits, the amounts of the fractions being expressed as weight percentages of the total sample, commonly with an indication of the ash percentage (and other characteristics, if required) of each fraction

3.2.3
washability curve
curve obtained from the results of a *float-and-sink analysis* (3.2.2) permitting the *theoretical yield* (8.3.2) of *floats* (8.3.11) or *sinks* (8.3.12) to be read off

Note 1 to entry: The following are examples of washability curves:

a) characteristic ash curve; see 3.2.4;

b) cumulative floats curve; see 3.2.6;

c) cumulative sinks curve; see 3.2.7;

d) densimetric (relative density) curve; see 3.2.8;

e) near-density curve; see 3.2.9;

f) instantaneous ash curve; see 3.2.15;

g) ash/relative density curve. See 3.2.14.

3.2.4
characteristic ash curve
curve obtained from the results of a *float-and-sink analysis* (3.2.2) showing, for any mass percentage of *floats* (8.3.11) [or *sinks* (8.3.12)] the ash percentage of the highest density (or lowest density) fraction passing into these *floats* (8.3.11) [or *sinks* (8.3.12)], the mass percentage being plotted on the ordinate (vertical axis) and the ash percentage on the abscissa (horizontal axis)

3.2.5
cumulative curve
curve expressing the results of combining successive relative density fractions or size fractions

3.2.6
cumulative floats curve
curve obtained from the results of a *float-and-sink analysis* (3.2.2) by plotting the cumulative mass percentage of *floats* (8.3.11) at each relative density against the cumulative ash of the total *floats* (8.3.11) at that density

3.2.7
cumulative sinks curve
curve obtained from the results of a *float-and-sink analysis* (3.2.2) by plotting the cumulative mass percentage of *sinks* (8.3.12) at each relative density against the cumulative ash of the total *sinks* (8.3.12) at that density

3.2.8
densimetric curve
<relative density curve> curve obtained from the results of a *float-and-sink analysis* (3.2.2) by plotting the cumulative mass percentage of *floats* (8.3.11) or *sinks* (8.3.12) against the relative density

3.2.9
near-density curve
difficulty curve
curve obtained from the results of a *float-and-sink analysis* (3.2.2), or from the *densimetric curve* (3.2.8), by plotting the mass percentage within the limits ± 0,1 of a given relative density against that relative density

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

3.2.11
actual performance curve
performance curve (3.2.10) showing the results actually obtained from a *coal preparation* (3.1.1) treatment

3.2.12
expected performance curve
performance curve (3.2.10) showing the expected results of a *coal preparation* (3.1.1) treatment

3.2.13
M-curve
Mayer curve
vectorial curve, obtained by plotting the cumulative ash percentages against their cumulative *yields* (8.1.3), used to express the *washability* (3.2.1) 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
curve obtained from the *float-and-sink analysis* (3.2.2) by plotting the ash percentages of successive fractions against the mean relative density of the fraction

3.2.15
ash/instantaneous
maximum ash percentage of any particle in any given relative density fraction mass

3.2.16
ash curve instantaneous
standard *washability curve* (3.2.3) that relates the maximum ash percentage of any particle (contained in a cumulative-floats mass) to the cumulative-floats mass of a known ash percentage

3.2.17
ash adventitious
ash arising from mineral matter that was not associated with the original plant material from which the coal was formed; this form of mineral can be removed readily by physical means

3.2.18
ash extraneous
ash arising from that part of the mineral matter associated with but not inherent in coal

3.2.19
ash inherent
ash arising from finely dispersed mineral matter present in the original plant material or from which the coal was formed, or from mineral matter incorporated intimately in the coal during the coalification process

3.2.20
Rosin-Rammler curve
particular form of particle size distribution curve graphed on specific ordinate and abscissa scales that results in any individual material's size distribution, due to natural *breakage* (7.1.6), being represented by a straight line

3.3 Capacity and throughput

3.3.1
nominal capacity
notional figure, expressed in mass per hour, used in the title of a *flowsheet* (3.1.24) and in the general description of a plant, applying to the plant and to the specific product under consideration

3.3.2
operational capacities
figures given on a *flowsheet* (3.1.24) 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)

3.3.3
design capacity
rate of *feed* (3.3.6) at which specific items of plant must operate continuously and give the guaranteed results on a particular quality of *feed* (3.3.6)

3.3.4
peak design capacity
rate of *feed* (3.3.6) in excess of the *design capacity* (3.3.3) that specific items of plant equipment will accept for short periods without necessarily fulfilling the performance guarantees given in respect of them

3.3.5
mechanical maximum capacity
highest rate of *feed* (3.3.6) at which specific items of equipment, not subject to performance guarantees, will function on the type and quality of *feed* (3.3.6) for which they are supplied

3.3.6
feed
material for treatment supplied to an appliance or plant

3.3.7
basic flowsheet
schematic diagram representing the various preparation process stages in the treatment of the *raw coal* (3.1.3)

3.3.8
process flowsheet
basic flowsheet (3.3.7) 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

3.3.9
equipment flowsheet
diagram indicating, by standard symbols, the units of equipment used in the various operational steps carried out within a *coal preparation plant* (3.1.19)

3.3.10
materials flowsheet
flowsheet (3.1.24) principally concerned with solid materials

3.3.11
liquids flowsheet
flowsheet (3.1.24) to indicate the flow of liquids throughout a series of operations

3.3.12
weighted flowsheet
capacity flowsheet
materials flowsheet (3.3.10) used in the design of a plant, including statements of the mass flow per hour at principal points in the plant

3.3.13
capacity design
rate of *feed* (3.3.6), defined by limits expressing the extent and duration of load variations, at which specific items of plant equipment, subject to a performance guarantee, operate continuously and give the guaranteed results on a quality of *feed* (3.3.6)

3.3.14
capacity peak design
rate of *feed* (3.3.6), in excess of the *design capacity* (3.3.3) that specific items of plant equipment will accept for short periods without fulfilling the performance guarantees given in respect of them

3.3.15
capacity mechanical maximum
highest rate of *feed* (3.3.6) at which specific items of equipment, not subject to performance guarantees, will function on the type and quality of *feed* (3.3.6) for which they are supplied

4 Terms related to sizing

4.1 General

4.1.1
sizing
division of a material into products between *nominal size* (4.1.6) limits

4.1.2
classification
separation of particles according to their size, density and shape by control of their settling rate through a fluid medium

4.1.3
size analysis
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

4.1.4
sieve analysis
size analysis (4.1.3) in which the division is carried out using test sieves

4.1.5
mean size
weighted average particle size of any sample, batch or consignment of particulate material

Note 1 to entry: Several bases for calculating mean size have been proposed which give results that vary widely for the same size distribution. The method of calculation should, therefore, always be stated whenever results are reported.

4.1.6
nominal size
limiting size
limit or limits of particle size used to describe a product of a *sizing* (4.1.1) operation

4.1.7
oversize
product of *coal preparation* (3.1.1) that, because of its ash percentage, is intermediate between coal and *discard* (3.1.11)

4.1.8
undersize
material in a product of size smaller than the lower *nominal size* (4.1.6) limit; may be expressed as a percentage of the product

4.1.9
dust
particles of solid material sufficiently fine to allow *suspension* (5.1.11) in air

Note 1 to entry: 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 1 to entry: upper limit may vary widely. To avoid confusion, the term should always be qualified by stating the *nominal size* (4.1.6).

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

4.1.12
oversize in undersize stream
<undersize stream>, particles that are larger than the nominal dimension of the size of the separation

4.1.13
undersize in oversize stream
particles in a screen *oversize* (4.1.7) stream that are smaller than the nominal dimensions of the screen apertures

4.1.14
nominal top size
size of aperture of the finest *sieve* (4.2.21) through which a minimum of 95 % of the mass of the material *passes* (11.3.29)