
**Pigments, dyestuffs and extenders —
Terminology —**

**Part 1:
General terms**

Pigments, colorants et matières de charge — Terminologie —

Partie 1: Termes généraux
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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 256, *Pigments, dyestuffs and extenders*.
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This second edition cancels and replaces the first edition (ISO 18451-1:2015), which has been technically revised. The main changes compared to the previous edition are as follows:

- the definition for colour difference (3.21) has been aligned with ISO 18314-4;
- the definition for extender (3.34) has been aligned with ISO 3262-1;
- the definitions for full shade (3.41) and mass tone (3.69) have been interchanged to align them with the practical use and with definitions in other standards, e.g. ISO 787-25;
- a note has been added to definitions 3.34 (extender) and 3.81 (nanoextender) concerning the use of the term “filler” as synonym for “extender” in some industries, e.g. rubber and paints;
- the terms nanomaterial (3.82), engineered nanomaterial (3.82.1), manufactured nanomaterial (3.82.2) and incidental nanomaterial (3.82.3) have been added;
- “may” has been changed to “can” in several notes;
- the text has been editorially revised.

A list of all parts in the ISO 18451 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 <https://www.iso.org/members.html>.

In addition to text written in the official ISO languages (English, French or Russian), this document gives text in German. This text is published under the responsibility of the member body for Germany (DIN) and is given for information only. Only the text given in the official languages can be considered as ISO text.

Pigments, dyestuffs and extenders — Terminology —

Part 1: General terms

1 Scope

This document defines terms that are used in the field of pigments, dyestuffs and extenders.

For some terms, reference is made to ISO 4618 in which also terms and definitions for colourants are given, relating to their use in coating materials.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

abrasiveness

property of *pigments* (3.96) or *extenders* (3.34) and their preparations to cause wear at the used apparatus by mechanical action

3.2

aluminium pigment

pigment (3.96) consisting essentially of finely divided pure aluminium Al 99,5

Note 1 to entry: The aluminium particles have lamellar form.

3.3

apparent density after tamping

ratio of mass to volume of a powder after compressing (e.g. by tamping or vibration) under specified conditions

3.4

barite

naturally occurring barium sulphate, BaSO₄

3.5

binder demand

amount of a binder or binder solution that is required to obtain, under specified dispersion conditions, a mass of defined rheology

3.6

bismuth vanadate pigment

yellow inorganic *pigment* (3.96) consisting of bismuth vanadate with or without isomorphous inclusion of bismuth molybdate

3.7

blanc fixe

synthetic barium sulphate, produced by a precipitation process

Note 1 to entry: Naturally occurring barium sulphate is called *barite* (3.4).

3.8

bleeding

migration (3.76) of a *colourant* (3.19) from a material into another material being in contact with it

3.9

blooming

migration (3.76) of a *colourant* (3.19) to the surface of the coloured material

3.10

cadmium pigment

inorganic coloured pigment consisting essentially of cadmium zinc sulphide (yellow pigments) or of mixed crystals of cadmium sulphide and cadmium selenide (red pigments)

3.11

calcined clay

calcined aluminium silicate

aluminium silicate ($\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$), lamellar, mainly amorphous in structure as determined by X-ray diffraction, produced from natural clay by thermal dehydration, consisting partly of crystalline mullite $3(\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2)$

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3.12 Calcite terms

3.12.1

calcite

crystalline calcium carbonate

<mineralogy> calcium carbonate of trigonal crystal structure

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3.12.2

calcite

crystalline calcium carbonate

<pigments> designation for *extenders* (3.34) produced from calcareous spar of marble or for precipitated calcitic calcium carbonates

3.13

carbon black

pigment (3.96) synthetically produced by thermally oxidative cracking of aromatic oils and gases

Note 1 to entry: It is distinguished between carbon black and industrial carbon black.

3.14

ceramic decoration colour

preparation consisting of coloured or colourless glass powder and inorganic *pigments* (3.96) for coating of ceramics or glass by melting at temperatures above 450 °C

3.15

chalking

appearance of a loosely adherent fine *powder* (3.98) on the surface of a film or pigmented plastic arising from the degradation of the binder

3.16

chroma

difference of a *colour* (3.20) from an achromatic colour of the same lightness

3.17**chromium oxide pigment**

inorganic coloured pigment consisting essentially of chromium (III) oxide (Cr_2O_3) in the form of a dry powder

3.18**CIC-pigment****coloured inorganic complex pigment**

coloured pigment, rutile or spinell based, produced by replacement of titanium in the rutile lattice or aluminium or magnesium in the spinel lattice through other atoms

Note 1 to entry: Such pigments are incorrectly named mixed phase pigments.

3.19**colourant**

generic term for all colouring substances

Note 1 to entry: Colourants comprise *pigments* (3.96) which are insoluble in the medium as well as *dyestuffs* (3.30) which are soluble in the medium.

Note 2 to entry: A colourant can contain the pure chemical substance and/or a surface treatment and/or additives.

Note 3 to entry: A colourant can also contain traces of impurities, which can originate from raw materials and/or the production processes.

Note 4 to entry: In order to improve application properties, a colourant can contain additives.

3.20**colour**

sensation resulting from the visual perception of light of a given spectral composition by the human eye

Note 1 to entry: The use of the German word "Farbe" alone, i.e. not in combinations of words, for coating materials is deprecated.

Note 2 to entry: A colour is characterized by *hue* (3.49), *saturation* (3.106) or *chroma* (3.16), and *lightness* (3.65).

Note 3 to entry: It is distinguished between chromatic and achromatic colours.

[SOURCE: ISO 4618:2014, 2.58, modified — Note 3 to entry has been added.]

3.21**colour difference**

ΔE^*

parameter of the perceived difference between two *colours* (3.20)

Note 1 to entry: The colour difference is defined by ΔE_{ab}^* in the CIELAB colour space (see ISO 11664-4) or ΔE_{uv}^* in the CIELUV colour space (see ISO/CIE 11664-5). For small colour differences between $0 < \Delta E_{ab}^* < 5$ it is recommended to use the DIN 99o formula (see DIN 6176) for industrial applications, because the CIELAB colour difference ΔE^* is not visually uniform.

Note 2 to entry: Since differences in trichromatic colour measuring systems do not or only approximately correspond to the perception of colour difference, currently different equations are being used in order to calculate colour differences from tristimulus values (colour difference formulas). ISO 11664-4 and DIN 6176 recommend specific colour difference equations.

3.22**colour strength equivalent**

reciprocal of the *relative tinting strength* (3.105) of a *pigment* (3.96)

Note 1 to entry: It indicates how many parts of a sample are colouristically equivalent to 100 parts of a reference sample. In other words, the colour strength equivalent of a weaker *pigment* (3.96) is greater than 100.

3.23 Compound terms

3.23.1

compound

<pigments> mixture of *pigments* (3.96) and/or *extenders* (3.34), ready for use

3.23.2

compound

<plastics> moulding material, ready for use, containing all the *colourants* (3.19), *extenders* (3.34) and additives

3.24

core pigment

pigment (3.96), the mostly inorganic core of which is enveloped with one or more (mostly inorganic) substances so that its optical properties are hardly effected by the material of the shell but its application properties are improved

3.25

corrosion-inhibiting pigment

anticorrosive pigment

pigment (3.95) that inhibits or avoids, in priming coats on metals, the corrosion of the metal surface, normally by chemical or physicochemical action

3.26

depth of shade

measure for the intensity of a colour perception that increases with increasing *chroma* (3.16) and decreases with increasing *lightness* (3.65)

Note 1 to entry: Colourations having the same depth of shade appear to be prepared using the same concentrations of colourants having the same *tinting strength* (3.122).

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3.27

dispersibility

property of a *pigment* (3.96) or *extender* (3.34) characterized by its ability to be wetted, separated and distributed in a medium

Note 1 to entry: The dispersibility depends on its wettability and on the number and strength of the adhering areas between the components of the *agglomerates* (3.94.3).

Note 2 to entry: As a measure of the dispersibility under specified dispersion conditions, e.g. the speed of the *tinting strength* (3.122) development and/or the decrease of the *fineness of grind* (3.37) can be taken.

3.28

dispersing

separation of the *agglomerates* (3.94.3) of the *pigment* (3.96) or *extender* (3.34) powder into smaller particles [*agglomerates* (3.94.3), *aggregates* (3.94.2) and *primary particles* (3.94.1)] and their wetting by the medium at the same time

Note 1 to entry: Occasionally, separation of *aggregates* (3.94.2) and breaking, for example, of needle-shaped *primary particles* (3.94.1) also takes place. Furthermore, a statistically uniform distribution of the *particles* (3.94) formed in this way to all volume elements of the medium is a part of the dispersing process.

3.29

dolomite

natural calcium magnesium carbonate containing between 1,18 and 1,23 parts by mass of CaCO₃ to 1 part by mass of MgCO₃

3.30**dyestuff**

colourant (3.19), soluble in the application medium

Note 1 to entry: *Colourants* (3.19) for glass, ceramics and vitreous enamel that are dissolved in the glass phase are also called “Lösungsfarben” in German language. In these cases, oxides of transition elements are used.

Note 2 to entry: In German usage, in the pharmaceutical and foodstuffs fields, the term “Farbstoff” is used as a synonym for “colourant”.

3.31**earth pigment**

pigment (3.96) produced from earths, e.g. by classification, if necessary with additional thermal treatment

3.32**effect pigment**

platelet-like *pigment* (3.96) that confers not only *colour* (3.20) but additional properties such as iridescence (interference at thin layers), angle dependency of colour (colour travel, colour flop, light-dark flop), or texture

Note 1 to entry: See also *metal effect pigment* (3.72), *nacreous pigment* (3.78), and *interference pigment* (3.51).

3.33**electro chromic pigment**

pigment (3.96) which changes its *colour* (3.20) depending on the electric current or the voltage

3.34**extender**

material in granular or powder form, practically insoluble to somewhat soluble in the application medium and used to modify or influence certain physical properties

Note 1 to entry: The German terms “Extender”, “Extenderpigment”, “Pigmentextender” or “Verschnittmittel” should be avoided.

Note 2 to entry: Whether a given substance is to be considered as *pigment* (3.96) or extender depends on its application.

Note 3 to entry: In some industries, such as rubber industries, “extender” is also called “filler” (see ISO 1382). In coatings industries, the term “extender” is preferred, because in ISO 4618, “filler” is defined as “coating material with a high proportion of extender, intended primarily to even out irregularities in substrates to be painted and to improve surface appearance”.

3.35**fastness**

stability of the *colour* (3.20)

Note 1 to entry: For characterization of the respective stress, the term fastness, e.g. of a coating, is used in word combinations such as light fastness, acid fastness, solvent fastness. The acid fastness, for example, of a coating is the stability of the *colour* (3.20) of the coating under the influence of acids.

3.36**final level of dispersion**

level of dispersion (3.62) when it has become constant under the defined conditions

Note 1 to entry: The final level of dispersion of a *pigment* (3.96) depends on the binder system in which it is dispersed, on the dispersion process and on the composition of the milling base.

3.37**fineness of grind**

measure for the largest solid particles in a liquid matrix

Note 1 to entry: The term fineness of grind is not to be confused with the term grain hardness.

3.38

floating

separation of one or more *pigments* (3.96) from a coloured coating material, causing streaks or areas of uneven *colour* (3.20) on the surface of the coat

[SOURCE: ISO 4618:2014, 2.121]

3.39

flooding

movement of *pigment* (3.96) particles in a liquid coating producing a *colour* (3.20) which, although uniform over the whole surface, is markedly different from that of the freshly applied wet film

Note 1 to entry: See *leafing* (3.61).

[SOURCE: ISO 4618:2014, 2.123]

3.40

food dyestuff

substance that gives *colour* (3.20) to a foodstuff or restores the colour of a foodstuff

3.41

full shade

colour (3.20) of a *mass tone system* (3.70) in optically infinite (hiding) layer

3.42

functional extender

extender (3.34), when applied in the application medium, processes or enhances specific functions due to its physical or chemical properties

Note 1 to entry: Examples for physical properties are: elasticity, durability, hardness, anti-fatigue.

3.43

functional pigment

pigment (3.96), when applied in the application medium, possesses specific functions due to its unique physical or chemical properties rather than only colouring

Note 1 to entry: Examples for specific functions are: UV absorption, electric properties such as conductivity, anti-corrosion properties, photocatalytic properties, function as barrier pigment, infrared absorption or infrared reflection.

3.44

goniochromatic pigment

effect pigment (3.32) showing an angle-dependent colour change between different interference colours

3.45

heat stability

resistance to a heat treatment of the *colour* (3.20) of the test specimens under specified conditions of test

3.46

heavy-metal containing pigment

pigment (3.96) containing heavy metal(s) as constituent

Note 1 to entry: Heavy metals are all metals having a density greater than 4,5 g/cm³.

3.47

hiding power

ability of coating to obliterate the *colour* (3.20) or *colour differences* (3.21) of the *substrate* (3.115)

Note 1 to entry: The use of the German expressions "Deckkraft" und "Deckfähigkeit" should be avoided.

Note 2 to entry: The term "coverage" is ambiguous because it is used in some instances to refer to hiding power and in others to mean spreading rate. The more precise terms hiding power and spreading rate should always be used.

[SOURCE: ISO 4618:2014, 2.138]

3.48

hiding power value

numerical value of the *hiding power* (3.47), as determined using a defined method

3.49

hue

type of *chroma* (3.16) of a *colour* (3.20)

Note 1 to entry: The hue is designated in daily life by words such as red, yellow, green, blue, violet, etc.

3.50

inclusion pigment

pigment (3.96), the colouring component of which is included in a coat of high thermal and chemical resistance

Note 1 to entry: The coat renders it possible that the colouring component can be used at much higher temperatures. Furthermore, the resistance, e.g. to acids and alkalies, will be improved essentially.

3.51

interference pigment

pearlescent pigment

effect pigment (3.32), the effect of which is based completely or predominantly on the phenomenon of interference, e.g. *pearlescent pigment*, fire-coloured metal bronze

Note 1 to entry: Interference pigments can be coated with one or more layers

3.52

intrinsic hardness

hardness of the primary particle of a *pigment* (3.96) or *extender* (3.34) as a property of the material

Note 1 to entry: Only indirect conclusions to the practically effective intrinsic hardness can be made, for example, from abrasion tests.

Note 2 to entry: In the case of inorganic pigments, the Mohs hardness is often given as a reference value for the intrinsic hardness.

3.53

iron blue pigment

pigment (3.96) formed by the reaction of iron salts with cyanoferrate(II) or cyanoferrate(III) ions and followed, if necessary, by treatment with oxidizing agents

3.54

iron oxide pigment

pigment (3.96) consisting of natural or synthetic iron oxides, if necessary with additions of extenders

3.55

kaolinite

main constituent of *natural clay* (3.89)

3.56

lake

pigment (3.96) produced by precipitation of a dissolved organic *dye stuff* (3.30) with a precipitating agent

Note 1 to entry: Lake is not "Lack" as commonly used in German language but a *colourant* (3.19). In Austrian and Swiss usage, the German expression "Farblack" is not usual.

3.57 Lake pigment terms