B03C

MAGNETIC OR ELECTROSTATIC SEPARATION OF SOLID MATERIALS FROM SOLID MATERIALS OR FLUIDS; SEPARATION BY HIGH-VOLTAGE ELECTRIC FIELDS (separating isotopes B01D 59/00; combinations of magnetic or electrostatic separation with separation of solids by other means B03B, B07B)

Definition statement

This place covers:

- Magnetic separation
- Separating dispersed particles from gases or vapour, e.g. air, by electrostatic effect
- Separating dispersed particles from liquids by electrostatic effect
- Separating solids from solids by electrostatic effect
- Separation by high-voltage electrical fields

Relationships with other classification places

B01D is the general subclass for separation. This subclass, B03C, covers magnetic or electrostatic separation of solid materials from solid materials or fluids, as well as separation by high-voltage electric fields. However, separation of isotopes by high-voltage electric fields or by magnetic or electrostatic separation is covered by main group B01D 59/00.

References

Limiting references

This place does not cover:

Separating isotopes	B01D 59/00
Combinations of magnetic or electrostatic separation with separation of solids by other means	B03B, B07B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Filters making use of electricity or magnetism	B01D 35/06
Separating sheets from piles	B65H 3/00
Magnets or magnet coils per se	H01F

B03C 1/00

Magnetic separation

Definition statement

This place covers:

Separation of particles out of a fluid or a stream of particles using magnetic effects.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Separation, e.g. filters in general	B01D
Processes for separating dispersed particles from gases or vapours by gravity, inertia or centrifugal forces	B01D 45/00, B01D 45/12
Combinations of cyclones with filters, for separating particles from gases or vapours	B01D 50/00
Processes for separation of gases or vapours or for recovering vapours of volatile solvents from gases by centrifugal force	B01D 53/24
Flotation; Differential sedimentation	B03D
Devices for separating or removing fatty or oily substances or similar floating material from water, waste water or sewage	C02F 1/40
Device in sewers for separating liquid or solid substances from sewage	E03F 5/14
Chemical analysis of biological material	G01N 33/50
Measuring, investigating or testing electric or magnetic properties of materials	G01R
Materials for magnets or magnetic bodies	H01F 1/00

Special rules of classification

The following Indexing Codes are used:

- Magnetic separation of gases from gases, e.g. oxygen from air, is classified with indexing symbol B03C 2201/16.
- Magnetic separation of particles suspended in a liquid is classified with indexing symbol B03C 2201/18.
- Magnetic separation of particles that are in a solid form is classified with indexing symbol B03C 2201/20.
- Magnetic separation characterised by magnetic field, special shape or generation is classified with indexing symbol B03C 2201/22.
- Magnetic separation characterised by parts that are easily removable for cleaning purposes is classified with indexing symbol B03C 2201/28.
- Magnetic separation used in or with vehicles is classified with indexing symbol B03C 2201/30.

B03C 1/002

{High gradient magnetic separation}

Definition statement

This place covers:

Any type of magnetic separation method that uses a high gradient magnetic field, which is directly acting on the substance being seperated.

References

Limiting references

This place does not cover:

Magnetic separation device that uses a high gradient magnetic field acting directly on the substance being separated	B03C 1/025
High gradient magnetic separation acting on the medium	B03C 1/32

B03C 1/005

Pretreatment specially adapted for magnetic separation

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Magnets or magnetic bodies characterised by the magnetic materials therefor; Selection of materials for their magnetic properties	H01F 1/00
Magnetic liquids	H01F 1/44

B03C 1/01

by addition of magnetic adjuvants

Definition statement

This place covers:

Any type of magnetic adjuvants not having an advanced chemical reaction with the particles to be separated.

B03C 1/015

by chemical treatment imparting magnetic properties to the material to be separated, e.g. roasting, reduction, oxidation

Definition statement

This place covers:

Any type of magnetic adjuvants having a chemical reaction with the particles to be separated.

B03C 1/025

High gradient magnetic separators

Definition statement

This place covers:

Magnetic separation devices that use high gradient magnetic fields.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Magnetic separation methods that use high gradient magnetic fields	B03C 1/002

B03C 1/029

with circulating matrix or matrix elements

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Matrix elements	B03C 1/034

B03C 1/0337

{superconductive}

Definition statement

This place covers:

Any detail about the construction of the superconductive coil.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Superconductive coils for open gradient separators	B03C 1/0355

B03C 1/034

characterised by the matrix elements

Definition statement

This place covers:

Any detail about the construction of the magnetic matrix of the matrix cleaning system.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

High gradient separators having (circulating) matrix elements	B03C 1/029

B03C 1/0355

using superconductive coils

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Details about the construction of the superconductive coil	B03C 1/0337

B03C 1/10

with cylindrical material carriers (B03C 1/247 takes precedence)

Definition statement

This place covers:

Magnetic separation in which either (a) the material to be separated or (b) the separated material is moved with cylindrical means.

References

Limiting references

This place does not cover:

With material carried by travelling fields obtained by a rotating drum	B03C 1/247

B03C 1/247

obtained by a rotating magnetic drum

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Devices whereby the material to be separated or the separated material is moved with cylindrical means	B03C 1/10

B03C 1/26

with free falling material (B03C 1/035 takes precedence)

References

Limiting references

This place does not cover:

Open gradient magnetic separators, i.e. separators in which the gap is unobstructed, characterised by the configuration of the gap	B03C 1/035

B03C 1/28

Magnetic plugs and dipsticks

Definition statement

This place covers:

Devices or methods for separating particles contained in a liquid.

Special rules of classification

The following Indexing Codes are used:

- Magnetic separation for particles suspended in a liquid is classified with indexing symbol B03C 2201/18.
- Magnetic separation for use in medical applications is classified with indexing symbol B03C 2201/26.

B03C 1/30

Combinations with other devices, not otherwise provided for

Definition statement

This place covers:

Typically used when the magnetic separation is part of a bigger process. However, documents should not be classified here when no (sufficient) details of the magnetic separation are disclosed

B03C 1/32

acting on the medium containing the substance being separated, e.g. magneto-gravimetric-, magnetohydrostatic-, or magnetohydrodynamic separation

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Sink-float separation using heavy liquids or suspensions	B03B 5/30

B03C 3/00

Separating dispersed particles from gases or vapour, e.g. air, by electrostatic effect

Definition statement

This place covers:

Methods or devices using an electrostatic effect for separating dispersed particles from gases or vapours, e.g. devices that use electrostatic effects for filtering air.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Exhaust or silencing apparatus for machines or engines having means for removing solid constituents of exhaust, using electric or electrostatic separators	F01N 3/01

Informative references

Attention is drawn to the following places, which may be of interest for search:

Domestic cleaning implements actuated by electrostatic attraction; Devices for cleaning same	A47L 13/40
Separation of gases or vapours; Recovering vapours of volatile solvents from gases; Chemical or biological purification of waste gases (e.g. engine exhaust gases, smoke, fumes, flue gases, aerosols) by electrostatic effects or by high-voltage electric fields	B01D 53/323
Cleaning by electrostatic means	B08B 6/00
Electric elements specially adapted for carrying off electrostatic charges from vehicles	B60R 16/06
Treatment of water, waste water, or sewage by electrochemical methods	C02F 1/46
Electrostatic machines	H02N
Carrying-off electrostatic charges in general	H05F

Special rules of classification

When the electrostatic effect is not used for separating, it should not be classified here.

The following Indexing Codes are used:

- Electrostatic separation including cleaning of the device by burning trapped particles is classified with indexing symbol B03C 2201/12.
- Electrostatic separation for gas that is moved electro-kinetically is classified with indexing symbol B03C 2201/14.
- Electrostatic separation including measuring or calculating of parameters or efficiency is classified with indexing symbol B03C 2201/24.
- Electrostatic separation for use in medical applications is classified with indexing symbol B03C 2201/26.
- Electrostatic separation for use in or with vehicles is classified with indexing symbol B03C 2201/30.
- Electrostatic separation including checking the quality of the result or the well-functioning of the device is classified with indexing symbol B03C 2201/32.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Separating	Dimensional modifications of particle-liquid distributions, e.g. particle immobilisation, caging, translational or rotational motion

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

ESP	electrostatic precipitator
DEP	di-electrophoresis
nDEP or pDEP	negative di-electrophoresis or positive di-electrophoresis

B03C 3/011

Prefiltering; Flow controlling

Definition statement

This place covers:

Mechanical filtering or flow control before the actual ESP filter.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Combinations of electrostatic separators, e.g. in parallel or in series, stacked separators, dry-wet separator combinations	B03C 3/025
Mechanical filtering combined with the ESP filter	B03C 3/155
Controlling flow of gases or vapour in the ESP filter	B03C 3/36

B03C 3/014

Addition of water; Heat exchange, e.g. by condensation

Definition statement

This place covers:

Adding water for the purpose of changing the characteristics of the gas mixture to be treated.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Wet-type ESP	B03C 3/16
Liquid electrodes	B03C 3/53
Cleaning the electrodes by washing	B03C 3/74

B03C 3/017

Combinations of electrostatic separation with other processes, not otherwise provided for

Definition statement

This place covers:

Typically used when the electrostatic separation is part of a bigger process. However, documents should not be classified here when no (sufficient) details of the electrostatic separation are disclosed

B03C 3/019

Post-treatment of gases

Definition statement

This place covers:

Mechanical filtering or flow control after the actual ESP filter.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Combinations of electrostatic separators, e.g. in parallel or in series, stacked separators, dry-wet separator combinations	B03C 3/025
Mechanical filtering combined with the ESP filter	B03C 3/155

B03C 3/02

Plant or installations having external electricity supply

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrode constructions	B03C 3/40

B03C 3/06

characterised by presence of stationary tube electrodes

Definition statement

This place covers:

Devices wherein a bundle of tube electrodes is used.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrode constructions	B03C 3/40

Constructional details of tubular collecting electrodes	B03C 3/49

B03C 3/09

characterised by presence of stationary flat electrodes arranged with their flat surfaces at right angles to the gas stream

Definition statement

This place covers:

Any device where the gas stream is forced to change direction to flow between the flat electrodes or where the gas stream is passing through the electrodes e.g. grid-electrodes

B03C 3/14

characterised by the additional use of mechanical effects, e.g. gravity (B03C 3/32 takes precedence)

References

Limiting references

This place does not cover:

Transportable units, e.g. for cleaning room air	B03C 3/32

Informative references

Attention is drawn to the following places, which may be of interest for search:

Separating particles from gases by gravity	B01D 45/02

B03C 3/15

Centrifugal forces

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Separating particles from gases by centrifuges	B01D 45/12
Centrifuges in general	B04B
Selective separation of solid materials carried by, or dispersed in, gas currents using centrifugal force	B07B 7/08

B03C 3/155

Filtration

Definition statement

This place covers:

Mechanical filtering combined with the actual ESP filter.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Mechanical filtering before the actual ESP filter	B03C 3/011
Mechanical filtering after the actual ESP filter	B03C 3/019
Combinations of electrostatic separators, e.g. in parallel or in series, stacked separators, dry-wet separator combinations	B03C 3/025

B03C 3/16

wet type

Definition statement

This place covers:

Devices where the added liquid (e.g. water) is not completely absorbed by the treated gas.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Adding water for the purpose of changing the characteristics of the gas mixture to be treated	B03C 3/014
Liquid, or liquid-film, electrodes	B03C 3/53
Cleaning the electrodes, e.g. by washing	B03C 3/74

B03C 3/32

Transportable units, e.g. for cleaning room air

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Room air-conditioners having an electrostatic separating stage	F24F

B03C 3/36

Controlling flow of gases or vapour

Definition statement

This place covers:

Flow control in the actual ESP filter.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Flow control before the ESP filter	B03C 3/011
Flow control after the ESP filter	B03C 3/019
Combinations of electrostatic separators, e.g. in parallel or in series, stacked separators, dry-wet separator combinations	B03C 3/025
Mechanical dry-type filtering, e.g. combined with the ESP filter	B03C 3/155

B03C 3/363

{located before the filter}

Definition statement

This place covers:

The flow control is located at the entrance of the ESP

B03C 3/365

{located after the filter}

Definition statement

This place covers:

The flow control is located at the exit of the ESP

B03C 3/38

Particle charging or ionising stations, e.g. using electric discharge, radioactive radiation or flames

Definition statement

This place covers:

Particle charging or ionising stations in which particles are electrostatically charged for the purpose of separating them, e.g. using electric discharge, radioactive radiation or flames.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrode constructions	B03C 3/40
Disinfection, sterilisation or deodorisation of air by ionisation	A61L 9/22
Air-conditioning systems applying an electrostatic field	F24F 8/192
Apparatus for generating ions to be introduced into non-enclosed gases	H01T 23/00
Ionising gases	H05H

B03C 3/40

Electrode constructions

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrode-carrying means	B03C 3/86

B03C 3/41

Ionising-electrodes

Special rules of classification

Indexing Symbols B03C 2201/04 – B03C 2201/10 have to be given in order to describe the type of electrode.

The following indexing symbols are used:

- Ionising electrode wires are classified with indexing symbol B03C 2201/04.
- Ionising electrode needles are classified with indexing symbol B03C 2201/06.
- Ionising electrode rods are classified with indexing symbol B03C 2201/08.
- Ionising electrodes including multiple serrated ends or parts are classified with indexing symbol B03C 2201/10.

B03C 3/455

{specially adapted for heat exchange with the gas stream (B03C 3/53 takes precedence)}

References

Limiting references

This place does not cover:

Liquid, or liquid-film, electrodes	B03C 3/53

B03C 3/47

flat, e.g. plates, discs, gratings

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

ESP having stationary flat electrodes arranged with their flat surfaces parallel to the gas stream	B03C 3/08
ESP having stationary flat electrodes arranged with their flat surfaces at right angles to the gas stream	B03C 3/09

B03C 3/49

tubular {(B03C 3/455 takes precedence)}

Definition statement

This place covers:

The details of the electrodes themselves

References

Limiting references

This place does not cover:

Collecting electrodes specially adapted for heat exchange with the gas stream	B03C 3/455

Informative references

Attention is drawn to the following places, which may be of interest for search:

Any type of device where a bundle of tube electrodes is used	B03C 3/06

B03C 3/53

Liquid, or liquid-film, electrodes

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Wet-type ESP	B03C 3/16
Cleaning the electrodes, e.g. by washing	B03C 3/74

B03C 3/68

Control systems therefor {(electricity supply or control systems for cleaning the electrodes B03C 3/746, B03C 3/763)}

Definition statement

This place covers:

Details about the electrical power supply of the ESP, except the emergency control aspects.

References

Limiting references

This place does not cover:

Electricity supply or control systems for cleaning the electrodes	B03C 3/746, B03C 3/763

Informative references

Attention is drawn to the following places, which may be of interest for search:

Emergency control systems	B03C 3/72
Power supply for an electrostatic spraying apparatus	B05B 5/0531, B05B 5/10

B03C 3/70

insulating in electric separators (B03C 3/53 takes precedence)

References

Limiting references

This place does not cover:

Liquid, or liquid-film, electrodes	B03C 3/53

Informative references

Attention is drawn to the following places, which may be of interest for search:

Use of special materials other than liquids for collecting electrodes	B03C 3/60
Protective coatings of housings	B03C 3/84
Electrode-carrying means	B03C 3/86

B03C 3/72

Emergency control systems

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Emergency protective circuit arrangements in general	H02H

B03C 3/74

Cleaning the electrodes

Special rules of classification

This subclass does not only cover the cleaning of the electrodes, but also covers all details about cleaning the interior of the ESP.

The following indexing symbols are used:

- Cleaning the device by burning of trapped particles is classified with indexing symbol B03C 2201/12.
- Parts being easily removable for cleaning purposes is classified with indexing symbol B03C 2201/28.
- Measuring or calculating parameters or efficiency are classified with indexing symbol B03C 2201/24.

- Checking the quality of the result or the well-functioning of the device is classified with indexing symbol B03C 2201/32.

B03C 3/746

{Electricity supply or control systems therefor}

References

Limiting references

This place does not cover:

Electricity supply or control systems of the ESP	B03C 3/68

B03C 3/763

{Electricity supply or control systems therefor}

References

Limiting references

This place does not cover:

Electricity supply or control systems of the ESP	B03C 3/68

B03C 3/78

by washing

Definition statement

This place covers:

Devices using a liquid where the purpose of the liquid is to clean.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Wet-type ESP	B03C 3/16
Liquid, or liquid-film, electrodes	B03C 3/53

B03C 3/82

Housings

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrode-carrying means	B03C 3/86

B03C 3/84

Protective coatings

Definition statement

This place covers:

Coatings or special layers of the housing, not of the electrodes.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrode constructions	B03C 3/40

B03C 3/86

Electrode-carrying means (B03C 3/40 takes precedence)

Definition statement

This place covers:

Details about the (mechanical) fixation of the electrodes (including the electrical isolators).

References

Limiting references

This place does not cover:

Electrode constructions	B03C 3/40

Informative references

Attention is drawn to the following places, which may be of interest for search:

Use of special materials other than liquids for collecting electrodes	B03C 3/60
Protective coatings of housings	B03C 3/84

B03C 3/88

Cleaning-out collected particles

Definition statement

This place covers:

Any detail about the removal of particles that have already been removed from the electrodes and/or walls.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Cleaning of the electrodes	B03C 3/74

B03C 5/00

Separating dispersed particles from liquids by electrostatic effect ({flocculation or agglomeration of electric particles induced by electric field B01D 21/0009;} combined with centrifuges B04B 5/10)

References

Limiting references

This place does not cover:

Flocculation or agglomeration of electric particles induced by electric field	B01D 21/0009
Combined with centrifuges	B04B 5/10

Informative references

Attention is drawn to the following places, which may be of interest for search:

Separation, other than separation of solids, not fully covered by a single other group or subclass, (e.g. B03C) by electrophoresis	B01D 57/02
Microreactors	B01J 19/0093
Treatment of microorganisms and apparatus therefor	C12M 1/42, C12N 13/00, C12Q 1/24
Investigating or analysing materials by the use of electric, electro-chemical, or magnetic means using electrophoresis	G01N 27/447
Analysis of biomaterial by electrical means	G01N 33/48707

Special rules of classification

The following indexing symbols are used:

- Electrostatic separation including measuring or calculating parameters or efficiency, is classified with indexing symbol B03C 2201/24.
- Electrostatic separation for use in medical applications, is classified with indexing symbol B03C 2201/26.
- Electrostatic separation including checking of the quality of the result or the well-functioning of the device, is classified with indexing symbol B03C 2201/32.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

ESP	electrostatic precipitator
DEP	di-electrophoresis
nDEP or pDEP	negative di-electrophoresis or positive di-electrophoresis

B03C 5/005

{Dielectrophoresis, i.e. dielectric particles migrating towards the region of highest field strength (B03C 5/02 takes precedence; electrophoresis B01D 57/02)}

Definition statement

This place covers:

Any method using di-electrophoresis for separating particles from a fluid. Separating fluids from fluids is in B03C 11/00

References

Limiting references

This place does not cover:

Any device using di-electrophoresis for separating particles from a fluid.	B03C 5/022

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electrophoresis	B01D 57/02

B03C 5/02

Separators

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dielectrophoresis, i.e. dielectric particles migrating towards the region of highest field strength for separating dispersed particles from liquids by electrostatic effect	B03C 5/005

B03C 9/00

Electrostatic separation not provided for in any single one of the other main groups of this subclass

Definition statement

This place covers:

Electrostatic separation not provided for in any single one of the other main groups of this subclass, e.g. other types of electrostatic separation, except for electrostatically separating liquids from liquids by high-voltage electrical fields.

References

References out of a residual place

Examples of places in relation to which this place is residual:

Magnetic separation	B03C 1/00
Separating dispersed particles from gases or vapour	B03C 3/00
Separating dispersed particles from liquids by electrostatic effect	B03C 5/00
Separating solids from solids by electrostatic effect	B03C 7/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electro-statically separating liquids from liquids by high-voltage electrical fields, not provided for in other groups of this subclass	B03C 11/00

B03C 11/00

Separation by high-voltage electrical fields, not provided for in other groups of this subclass

Definition statement

This place covers:

This group is used for electrostatically separating liquids from liquids by high-voltage electrical fields, not provided for in other groups of this subclass.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Separation of liquids with coalescers	B01D 17/045
Separation of liquids from each other by electricity	B01D 17/06
Filters i.e. particle separators or filtering processes specially modified for separating dispersed particles from gases or vapours including coalescing means for the separation of liquid	B01D 46/003
Refining of hydrocarbons oils by electric or magnetic mean	C10G 32/02

Special rules of classification

The following Indexing Codes are used:

- Electrostatically separating liquids from liquids, is classified with indexing symbol B03C 2201/02.