

CPC COOPERATIVE PATENT CLASSIFICATION

B01D **SEPARATION** (separating solids from solids by wet methods [B03B](#), [B03D](#); by pneumatic jigs or tables [B03B](#); by other dry methods [B07](#); magnetic or electrostatic separation of solid materials from solid materials or fluids, separation by high-voltage electric fields [B03C](#); centrifuges, vortex apparatus [B04](#); presses *per se* for squeezing-out liquid from liquid-containing material [B30B 9/02](#); treatment of water [C02F](#), e.g. softening by ion-exchange [C02F 1/42](#); {arrangements of air intake cleaners in gas turbine plants [F02C 7/05](#) } ; arrangements or mounting of filters in air-conditioning, air-humidification or ventilation [F24F 13/28](#))

NOTES

1. This subclass covers:
 - evaporation, distillation, crystallisation, filtration, dust precipitation, gas cleaning, absorption, adsorption;
 - similar processes which are not concerned with, or limited to, separation (except in the case of absorption or adsorption).
2. In this subclass the terms or expressions are used with the meaning indicated:
 - "filtration" and analogous terms include straining solids from fluids;
 - "filter medium" is a porous material or porous arrangement of material used to filter solids from fluids;
 - "filtering element" is a section of filter medium in addition to parts to which the medium is demountably or permanently fixed, including other sections of medium, end caps, peripheral frames or edge strips, but excluding housings;
 - "filter housing" is the fluid-constraining impervious vessel, whether open or closed, which contains, or is adapted to contain, one or more filtering elements or filter media;
 - "filter chamber" is the space within a housing, where filtering elements or filter media are located. Partitions may divide a single housing into a plurality of chambers;
 - "filtering apparatus" consists of filtering elements combined with housings, cleaning arrangements, motor or the like parts, which are characteristic of the particular type of apparatus. Ancillary devices such as pumps or valves are considered part of a filtering apparatus when inside the apparatus. Ancillary devices performing similar or different unit operation such as comminutors, mixers or non-filtering separators, whether or not inside the apparatus, are not considered part of a filtering apparatus. The term does not extend to apparatus, e.g. washing machines, of which the filter forms only a part.
3. For apparatus used in drying or evaporation, [F26](#) takes precedence over [B01D](#).
4. Group [B01D 59/00](#) takes precedence over the other groups of this subclass and over other subclasses in class [B01](#)

WARNINGS

1. The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following groups:

B01D 19/0454	covered by	B01D 9/00
B01D 15/04	covered by	B01J 39/00- B01J 49/90
B01D 17/022	covered by	B01D 17/0202
B01D 17/025	covered by	B01D 17/0208
B01D 17/028	covered by	B01D 17/0211
B01D 17/032	covered by	B01D 17/0214
B01D 17/035	covered by	B01D 17/0205
B01D 17/038	covered by	B01D 17/0217
B01D 17/05	covered by	B01D 17/047
B01D 17/09	covered by	B01D 17/005
B01D 17/12	covered by	B01D 17/00
B01D 25/133	covered by	B01D 25/285
B01D 25/168	covered by	B01D 25/285
B01D 25/21	covered by	B01D 25/164
B01D 29/075	covered by	B01D 29/62, B01D 29/76
B01D 29/37	covered by	B01D 29/336, B01D 29/356
B01D 33/052	covered by	B01D 33/64
B01D 35/01	covered by	B01D 36/001
B01D 61/26	covered by	A61M 1/1656
B01D 61/34	covered by	A61M 1/16
2. 5. The group [B01D 24/00](#) was introduced in March 1989. This group includes subject matter of [B01D 23/00](#), [B01D 25/06](#), [B01D 25/10](#), [B01D 29/0027](#), [B01D 33/0032](#) and [B01D 33/0054](#).
3. 6. Documents from the backlog of the group [B01D 23/00](#), and the subgroups [B01D 25/06](#), [B01D 25/10](#), [B01D 29/0027](#), [B01D 33/0032](#) and [B01D 33/0054](#) are in the process of being revised and also systematically transferred to [B01D 24/00](#).

4. 7. The groups [B01D 29/01](#) - [B01D 29/43](#) and [B01D 29/50](#) - [B01D 29/965](#) were introduced in March 1989; these subgroups include the subject matter of the subgroups of groups [B01D 29/0002](#), which are from this date no longer use for the classification of new documents.
5. 8. The documents from the backlog of the subgroups of group [B01D 29/0002](#) are in the process of being systematically transferred to the other subgroups of group [B01D 29/00](#).
6. 11. The documents from the backlog of the subgroups of group [B01D 33/0003](#) are in the process of being systematically transferred to the other subgroups of group [B01D 33/00](#).
7. 9. Groups [B01D 25/16](#), [B01D 25/18](#) and [B01D 25/20](#) are no longer used for the classification of new. Patent documents are continuously being reclassified to groups [B01D 29/44](#), [B01D 29/46](#) and [B01D 29/48](#).
8. 10. The groups [B01D 25/04](#), [B01D 25/08](#), [B01D 25/121](#), [B01D 25/122](#), [B01D 25/124](#), [B01D 25/125](#), [B01D 25/14](#), are no longer used for classification of new documents from December 1, 2011 onwards. The backlog of those groups are being continuously reclassified to groups [B01D 25/00](#), [B01D 29/00](#) and subgroups.

1/00	Evaporating ({evaporation in general, e.g. of liquids for gas phase reactions B01B 1/005 } ; removal of incrustation B08B ; preparation of starch C08B 30/00 ; sugar industry C13 ; prevention of incrustation C23F ; drying solid materials or objects by evaporating liquids therefrom F26)	1/222	. . {In rotating vessels; vessels with movable parts}
		1/223	. . . {containing a rotor}
		1/225	. . . . {with blades or scrapers}
		1/226	. . . . . {in the form of a screw or with helical blade members}
		1/227	. . . . . {with brushes}
1/0005	. {Evaporating devices suitable for floating on water}	1/228	. . . {horizontally placed cylindrical container or drum (B01D 1/223 takes precedence)}
1/0011	. {Heating features}		
1/0017	. . {Use of electrical or wave energy (B01D 1/0029 takes precedence)}	1/24	. . to obtain dry solids
1/0023	. . . {Induction heating}	1/26	. Multiple-effect evaporating
1/0029	. . {Use of radiation}	1/28	. with vapour compression
1/0035	. . . {Solar energy (for treatment of water C02F 1/14)}	1/2803	. . {Special features relating to the vapour to be compressed}
1/0041	. . {Use of fluids}	1/2806	. . . {The vapour is divided in at least two streams and only a part of the vapour is compressed}
1/0047	. . . {in a closed circuit (B01D 3/007 takes precedence)}	1/2809	. . . . {At least two streams are compressed}
1/0052	. . . {Use of a liquid transfer medium or intermediate fluid, e.g. bain-marie}	1/2812	. . . . {The vapour is coming from different sources}
1/0058	. . {Use of waste energy from other processes or sources, e.g. combustion gas (for water treatment C02F 1/16)}	1/2815	. . . . . {At least one source is a compressor}
		1/2818	. . . {Cleaning of the vapour before compression, e.g. demisters, washing of the vapour}
1/0064	. {Feeding of liquid into an evaporator}	1/2821	. . . {B2+B2B}
1/007	. . {the liquid feed being split up in at least two streams before entering the evaporator}	1/2825	. . . {B2+B4}
		1/2828	. . . {B2+B4B}
1/0076	. . {Maintaining the liquid in the evaporator at a constant level}	1/2831	. . . {B2B+B4}
		1/2834	. . . {B2B+B4B}
1/0082	. {Regulation; Control}	1/2837	. . . {B4+B4B}
1/0088	. {Cascade evaporators}	1/284	. . {Special features relating to the compressed vapour}
1/0094	. {with forced circulation}	1/2843	. . . {The compressed vapour is divided in at least two streams}
1/02	. Evaporators with heating coils	1/2846	. . . {The compressed vapour is not directed to the same apparatus from which the vapour was taken off}
1/04	. Evaporators with horizontal tubes		
1/06	. Evaporators with vertical tubes	1/285	. . . {In combination with vapour from an other source}
1/065	. . {by film evaporating}	1/2853	. . . . {At least one of the other sources is a compressor, ejector}
1/08	. . with short tubes (B01D 1/12 { B01D 1/065 } take precedence)	1/2856	. . . {The compressed vapour is used for heating a reboiler or a heat exchanger outside an evaporator}
1/10	. . with long tubes, e.g. Kestner evaporators (B01D 1/12 { B01D 1/065 } take precedence)	1/2859	. . . {D2+D4}
1/12	. . and forced circulation		
1/14	. with heated gases or vapours {or liquids} in contact with the liquid		
1/16	. by spraying (B01D 1/22 takes precedence)		
1/18	. . to obtain dry solids (B01D 1/24 takes precedence)		
1/20	. . Sprayers (in general B05B)		
1/22	. by bringing a thin layer of the liquid into contact with a heated surface {(B01D 1/065 takes precedence)}		
1/221	. . {Composite plate evaporators}		

NOTE

Documents are only classified in [B01D 1/2843](#) when at least one stream is directed to the same apparatus from which the vapour was taken off

- 1/2862 . . . {D2+D4+D6}
- 1/2865 . . . {D2+D4+D6B}
- 1/2868 . . . {D2+D6}
- 1/2871 . . . {D2+D6B}
- 1/2875 . . . {D4+D6}
- 1/2878 . . . {D4+D6B}
- 1/2881 . . {Compression specifications (e.g. pressure, temperature, processes)}
- 1/2884 . . {Multiple effect compression ([B01D 1/2815](#), [B01D 1/2828](#), [B01D 1/2834](#) and [B01D 1/2837](#) take precedence)}
- 1/2887 . . {The compressor is integrated in the evaporation apparatus}
- 1/289 . . {Compressor features (e.g. constructions, details, cooling, lubrication, driving systems)}
- 1/2893 . . . {Driving systems}
- 1/2896 . . {Control, regulation}
- 1/30 . Accessories for evaporators; {Constructional details thereof}
- 1/305 . . {Demister (vapour-liquid separation)}
- 3/00 Distillation or related exchange processes in which liquids are contacted with gaseous media, e.g. stripping** ({evaporation in general, e.g. of liquids for gas phase reactions [B01B 1/005](#) ; gas chromatography [B01D 15/08](#); destructive distillation [C10B](#); preparation of alcoholic beverages by distillation [C12G 3/12](#))
- 3/001 . {Processes specially adapted for distillation or rectification of fermented solutions}
- 3/002 . . {by continuous methods}
- 3/003 . . {Rectification of spirit}
- 3/004 . . . {by continuous methods}
- 3/005 {Combined distillation and rectification}
- 3/006 . {by vibration}
- 3/007 . {Energy recuperation; Heat pumps}
- 3/008 . {Liquid distribution}
- 3/009 . {in combination with chemical reactions}
- 3/02 . in boilers or stills
- 3/04 . pipe stills
- 3/06 . Flash distillation
- 3/065 . . {Multiple-effect flash distillation (more than two traps)}
- 3/08 . in rotating vessels; Atomisation on rotating discs ([B01D 1/222](#) , [B01D 3/10](#) take precedence)
- 3/085 . . {using a rotary evaporator}
- 3/10 . Vacuum distillation ([B01D 3/12](#) takes precedence)
- 3/101 . . {Recirculation of the fluid used as fluid working medium in a vacuum creating device}
- 3/103 . . {by using a barometric column}
- 3/105 . . {with the use of an ejector for creating the vacuum, the ejector being placed between evaporator or distillation devices}
- 3/106 . . {with the use of a pump for creating vacuum and for removing the distillate}
- 3/108 . . {using a vacuum lock for removing the concentrate during distillation}
- 3/12 . Molecular distillation
- 3/14 . Fractional distillation {or use of a fractionation or rectification column}
- 3/141 . . {where at least one distillation column contains at least one dividing wall}
- 3/143 . . {by two or more of a fractionation, separation or rectification step}
- 3/145 . . . {One step being separation by permeation}
- 3/146 . . . {Multiple effect distillation}
- 3/148 . . . {in combination with at least one evaporator}
- 3/16 . . Fractionating columns in which vapour bubbles through liquid ([packing elements B01J 19/30](#), [B01J 19/32](#))
- 3/163 . . . {Plates with valves}
- 3/166 . . . {Heating and/or cooling of plates}
- 3/18 . . . with horizontal bubble plates
- 3/20 Bubble caps; Risers for vapour; Discharge pipes for liquid
- 3/205 {Bubble caps}
- 3/22 . . . with horizontal sieve plates or grids; Construction of sieve plates or grids
- 3/225 {Dual-flow sieve trays}
- 3/24 . . . with sloping plates or elements mounted stepwise
- 3/26 . . Fractionating columns in which vapour and liquid flow past each other, or in which the fluid is sprayed into the vapour, or in which a two-phase mixture is passed in one direction
- 3/28 . . . Fractionating columns with surface contact and vertical guides, e.g. film action
- 3/30 . . Fractionating columns with movable parts or in which centrifugal movement is caused
- 3/32 . . Other features of fractionating columns; {Constructional details of fractionating columns not provided for in groups [B01D 3/16](#) - [B01D 3/30](#)}
- 3/322 . . . {Reboiler specifications}
- 3/324 . . . {Tray constructions}
- 3/326 {Tray supports}
- 3/328 {Sealing between the column and the trays}
- 3/34 . with one or more auxiliary substances
- 3/343 . . {the substance being a gas}
- 3/346 . . . {the gas being used for removing vapours, e.g. transport gas}
- 3/36 . . Azeotropic distillation
- 3/38 . . Steam distillation
- 3/40 . . Extractive distillation
- 3/42 . Regulation; Control
- 3/4205 . . {Reflux ratio control splitter}
- 3/4211 . . {of columns}
- 3/4216 . . . {Head stream}
- 3/4222 . . . {Head- and side stream}
- 3/4227 . . . {Head- and bottom stream}
- 3/4233 . . . {Head- and feed stream}
- 3/4238 . . . {Head-, side- and bottom stream}
- 3/4244 . . . {Head-, side- and feed stream}
- 3/425 . . . {Head-, bottom- and feed stream}
- 3/4255 . . . {Head-, side-, bottom- and feed stream}
- 3/4261 . . . {Side stream}
- 3/4266 . . . {Side- and bottom stream}
- 3/4272 . . . {Side- and feed stream}
- 3/4277 . . . {Side-, bottom- and feed stream}
- 3/4283 . . . {Bottom stream}
- 3/4288 . . . {Bottom- and feed stream}
- 3/4294 . . . {Feed stream}
- 5/00 Condensation of vapours; Recovering volatile solvents by condensation** ([B01D 8/00](#) takes precedence; condensers [F28B](#))

- 5/0003 . {by using heat-exchange surfaces for indirect contact between gases or vapours and the cooling medium}
- 5/0006 . . {Coils or serpentines}
- 5/0009 . . {Horizontal tubes}
- 5/0012 . . {Vertical tubes}
- 5/0015 . . {Plates}
- 5/0018 . . {Dome shaped ([B01D 5/0066](#) takes precedence)}
- 5/0021 . . {Vortex}
- 5/0024 . . {Rotating vessels or vessels containing movable parts}
- 5/0027 . {by direct contact between vapours or gases and the cooling medium}
- 5/003 . . {within column(s)}
- 5/0033 . {Other features}
- 5/0036 . . {Multiple-effect condensation; Fractional condensation}
- 5/0039 . . {Recuperation of heat, e.g. use of heat pump(s), compression}
- 5/0042 . . {Thermo-electric condensing; using Peltier-effect}
- 5/0045 . . {Vacuum condensation}
- 5/0048 . . {Barometric condensation}
- 5/0051 . . {Regulation processes; Control systems, e.g. valves}
- 5/0054 . . {General arrangements, e.g. flow sheets}
- 5/0057 . {in combination with other processes}
- 5/006 . . {with evaporation or distillation}
- 5/0063 . . . {Reflux condensation}
- 5/0066 . . . {Dome shaped condensation}
- 5/0069 . . {with degasification or deaeration}
- 5/0072 . . {with filtration}
- 5/0075 . . {with heat exchanging ([B01D 5/0039](#) takes precedence)}
- 5/0078 . {characterised by auxiliary systems or arrangements}
- 5/0081 . . {Feeding the steam or the vapours}
- 5/0084 . . {Feeding or collecting the cooling medium ([B01D 5/0087](#) takes precedence)}
- 5/0087 . . {Recirculating of the cooling medium}
- 5/009 . . {Collecting, removing and/or treatment of the condensate}
- 5/0093 . . {Removing and treatment of non condensable gases}
- 5/0096 . . {Cleaning ([cleaning in general B08B](#))}
- 7/00 Sublimation** ([B01D 8/00](#) takes precedence; freeze-drying F26)
- 7/02 . Crystallisation directly from the vapour phase ([into single crystals C30B 23/00](#))
- 8/00 Cold traps; Cold baffles** ([pumps for evacuating by condensing or freezing F04B 37/08](#))
- 9/00 Crystallisation** (crystallisation directly from the vapour phase [B01D 7/02](#); making single crystals [C30B](#); {crystallisation as part of the Bayer process also classified in [C01F 7/14](#)})
- 9/0004 . {cooling by heat exchange (by evaporation of components of the mixture to be separated [B01D 9/0013](#); refrigeration machines [F25B](#))}
- 9/0009 . . {by direct heat exchange with added cooling fluid}
- 9/0013 . . {by indirect heat exchange}
- 9/0018 . {Evaporation of components of the mixture to be separated}
- 9/0022 . . {by reducing pressure}
- 9/0027 . . {by means of conveying fluid, e.g. spray-crystallisation ([spray-drying F26B](#))}
- 9/0031 . . {by heating ([B01D 9/0022](#), [B01D 9/0027](#) take precedence)}
- 9/0036 . {Crystallisation on to a bed of product crystals; Seeding}
- 9/004 . {Fractional crystallisation; Fractionating or rectifying columns}
- 9/0045 . . {Washing of crystals, e.g. in wash columns}
- 9/005 . {Selection of auxiliary, e.g. for control of crystallisation nuclei, of crystal growth, of adherence to walls; Arrangements for introduction thereof}
- 9/0054 . . {Use of anti-solvent}
- 9/0059 . {General arrangements of crystallisation plant, e.g. flow sheets}
- 9/0063 . {Control or regulation ([control per se G05](#))}
- 9/0068 . {Prevention of crystallisation}
- 9/0072 . {Crystallisation in microfluidic devices}
- 9/0077 . {Screening for crystallisation conditions or for crystal forms}
- 9/0081 . {Use of vibrations, e.g. ultrasound}
- 2009/0086 . {Processes or apparatus therefor}
- 2009/009 . . {Separation of organic compounds by selective or extractive crystallisation with the aid of auxiliary substances forming complex or molecular compounds, e.g. with ureum, thiourem or metal salts}
- 2009/0095 . . . {with the aid of other complex forming substances than ureum, thiourem or metal salts}
- 9/02 . from solutions {not used}
- 9/04 . . concentrating solutions by removing frozen solvent therefrom
- 11/00 Solvent extraction**
- 2011/002 . {Counter-current extraction}
- 2011/005 . {Co-current extraction}
- 2011/007 . {Extraction using a solvent in the gas phase}
- 11/02 . of solids
- NOTE**
- Combinations of characteristics of individual groups, e.g. [B01D 11/0226](#) and [B01D 11/028](#) are expressed as [B01D 11/0226](#) + [B01D 11/028](#)
- 11/0203 . . {with a supercritical fluid}
- 11/0207 . . {Control systems}
- 11/0211 . . {in combination with an electric or magnetic field}
- 11/0215 . . {Solid material in other stationary receptacles}
- 11/0219 . . . {Fixed bed of solid material}
- 11/0223 . . . {Moving bed of solid material ([see also B01D 11/0261](#))}
- 11/0226 {with the general transport direction of the solids parallel to the rotation axis of the conveyor, e.g. worm}
- 11/023 {using moving bands, trays fixed on moving transport chains}

- 11/0234 {using other slow rotating arms or elements, whereby the general transport direction of the solids is not parallel to the rotation axis, e.g. perpendicular ([B01D 11/0238](#) takes precedence)}
- 11/0238 {on fixed or rotating flat surfaces, e.g. tables combined with rotating elements or on rotating flat surfaces}
- 11/0242 {in towers, e.g. comprising contacting elements}
- 11/0246 {comprising rotating means}
- 11/0249 {comprising jet means}
- 11/0253 . . . {Fluidised bed of solid materials}
- 11/0257 {using mixing mechanisms, e.g. stirrers, jets ([B01D 11/0242](#) takes precedence)}
- 11/0261 . . {comprising vibrating mechanisms, e.g. mechanical, acoustical}
- 11/0265 . . . {Applying ultrasound}
- 11/0269 . . {Solid material in other moving receptacles ([B01D 11/0238](#) takes precedence)}
- 11/0273 . . . {in rotating drums}
- 11/0276 {with the general transport direction of the solids parallel to the rotation axis of the conveyor, e.g. spirals}
- 11/028 . . {Flow sheets}
- 11/0284 . . . {Multistage extraction}
- 11/0288 . . {Applications, solvents}
- 11/0292 . . {Treatment of the solvent}
- 11/0296 . . . {Condensation of solvent vapours ([condensation in general B01D 5/00](#))}
- 11/04 . . of solutions which are liquid
- 11/0403 . . {with a supercritical fluid}
- 11/0407 . . . {the supercritical fluid acting as solvent for the solute}
- 11/0411 . . . {the supercritical fluid acting as solvent for the solvent and as anti-solvent for the solute, e.g. formation of particles from solutions}
- 11/0415 . . {in combination with membranes}
- 11/0419 . . {in combination with an electric or magnetic field or with vibrations}
- 11/0423 . . . {Applying ultrasound}
- 11/0426 . . {Counter-current multistage extraction towers in a vertical or sloping position}
- 11/043 . . . {with stationary contacting elements, sieve plates or loose contacting elements}
- 11/0434 . . . {comprising rotating mechanisms, e.g. mixers, rotational oscillating motion, mixing pumps}
- 11/0438 . . . {comprising vibrating mechanisms, electromagnetic radiations}
- 11/0442 . . . {Mixers with gas-agitation}
- 11/0446 . . {Juxtaposition of mixers-settlers}
- 11/0449 . . . {with stationary contacting elements}
- 11/0453 . . . {with narrow passages limited by plates, walls, e.g. helically coiled tubes ([B01D 11/0461](#) takes precedence)}
- 11/0457 . . . {comprising rotating mechanisms, e.g. mixers, mixing pumps}
- 11/0461 . . . {mixing by counter-current streams provoked by centrifugal force}
- 11/0465 . . . {comprising vibrating mechanisms, radiations}
- 11/0469 . . . {with gas agitation}
- 11/0473 . . . {Jet mixers, venturi mixers}
- 11/0476 . . {Moving receptacles, e.g. rotating receptacles}
- 11/048 {Mixing by counter-current streams provoked by centrifugal force, in rotating coils or in other rotating spaces}
- 11/0484 . . {Controlling means}
- 11/0488 . . {Flow sheets}
- 11/0492 . . {Applications, solvents used}
- 11/0496 . . {by extraction in microfluidic devices}
- 12/00** **Displacing liquid, e.g. from wet solids or from dispersions of liquids or from solids in liquids, by means of another liquid**
WARNING
Attention is drawn to WARNING (6) following the subclass title
- 15/00** **Separating processes involving the treatment of liquids with solid sorbents (using liquid sorbents [B01D 11/00](#); ion exchange processes or materials, sorbent materials in general [B01J](#), e.g. sorbents for chromatography [B01J 20/281](#); for investigating or analysing materials [G01N 30/00](#)); Apparatus therefor**
 - 15/02 . with moving adsorbents
 - 15/08 . Selective adsorption, e.g. chromatography**NOTE**
In order that group [B01D 15/08](#) may provide a basis for a complete search with respect to chromatography in general, all subject matter of general interest is classified in this group even if it is classified primarily in the application-oriented groups, for example dairy products [A23C 9/148](#), treatment of blood, e.g. [A61M 1/36](#), optically active organic compounds [C07B 57/00](#) or peptides [C07K 1/16](#)
 - 15/10 . . characterised by constructional or operational features
 - 15/12 . . . relating to the preparation of the feed
 - 15/125 {Pre-filtration}
 - 15/14 . . . relating to the introduction of the feed to the apparatus
 - 15/16 . . . relating to the conditioning of the fluid carrier
 - 15/161 {Temperature conditioning}
 - 15/163 {Pressure or speed conditioning}
 - 15/165 {Flash chromatography}
 - 15/166 {Fluid composition conditioning, e.g. gradient}
 - 15/168 {pH gradient, chromatofocusing, i.e. separation according to the isoelectric point pI}
 - 15/18 . . . relating to flow patterns
 - 15/1807 {using counter-currents, e.g. fluidised beds}
 - 15/1814 {recycling of the fraction to be distributed}
 - 15/1821 {Simulated moving beds}
 - 15/1828 {characterized by process features}
 - 15/1835 {Flushing}
 - 15/1842 {characterized by apparatus features}
 - 15/185 {characterized by the components to be separated}
 - 15/1857 {Reactive simulated moving beds}
 - 15/1864 {using two or more columns}
 - 15/1871 {placed in series}

15/1878	. . . . . {for multi-dimensional chromatography}	15/3861	. . . . . {using an external stimulus}
15/1885	. . . . . {placed in parallel}	15/3866	. . . . . {using ultra-sound}
15/1892	. . . . . {the sorbent material moving as a whole, e.g. continuous annular chromatography, true moving beds}	15/3871	. . . . . {using light}
15/20	. . . relating to the conditioning of the sorbent material	15/3876	. . . . . {modifying the temperature}
15/203	. . . . . {Equilibration or regeneration}	15/388	. . . . . {modifying the pH}
15/206	. . . . . {Packing or coating}	15/3885	. . . . . {Using electrical or magnetic means}
15/22	. . . relating to the construction of the column	2015/389	. . . . . {using ultra-sound}
15/24	. . . relating to the treatment of the fractions to be distributed	2015/3895	. . . . . {using light}
15/242	. . . . . {Intermediate storage of effluents}	15/40	. . . using supercritical fluid as mobile phase or eluent
15/245	. . . . . {Adding materials to the effluents}	15/42	. . characterised by the development mode, e.g. by displacement or by elution
15/247	. . . . . {Fraction collectors}	15/422	. . . {Displacement mode}
15/26	. . characterised by the separation mechanism	15/424	. . . {Elution mode}
15/265	. . . {Adsorption chromatography}	15/426	. . . . . {Specific type of solvent}
15/30	. . . Partition chromatography	15/428	. . . {Frontal mode}
15/305	. . . . . {Hydrophilic interaction chromatography [HILIC]}	17/00	Separation of liquids, not provided for elsewhere, e.g. by thermal diffusion (devices for separating or removing fatty or oily substances or similar floating material from water, waste water, or sewage C02F 1/40; cleaning or keeping clear the surface of open water from oil or like materials E02B 15/04; arrangements for separating lubricants from refrigerants F25B 43/02)
15/32	. . . Bonded phase chromatography		NOTE
15/322	. . . . . {Normal bonded phase}		in this group, documents are classified and arranged according to a combination system limited to the symbols of the group and subgroups of B01D 17/00 . In this system each combination is indicated, also of subgroups depending from the same group, e.g. B01D 17/041 + B01D 17/042
15/325	. . . . . {Reversed phase}		
15/327	. . . . . {with hydrophobic interaction}		
15/34	. . . Size selective separation, e.g. size exclusion chromatography, gel filtration, permeation		
15/345	. . . . . {Perfusive chromatography}	17/005	. {by thermal diffusion}
15/36	. . . involving ionic interaction	17/02	. Separation of non-miscible liquids
15/361	. . . . . {Ion-exchange}	17/0202	. . {by ab- or adsorption}
15/362	. . . . . {Cation-exchange}	17/0205	. . {by gas bubbles or moving solids}
15/363	. . . . . {Anion-exchange}	17/0208	. . {by sedimentation}
15/364	. . . . . {Amphoteric or zwitterionic ion-exchanger}	17/0211	. . . {with baffles}
15/365	. . . . . {Ion-exclusion}	17/0214	. . . {with removal of one of the phases}
15/366	. . . . . {Ion-pair, e.g. ion-pair reversed phase}	17/0217	. . {by centrifugal force}
15/367	. . . . . {Ion-suppression}	17/04	. . Breaking emulsions
15/368	. . . . . {Cation- pi interaction}	17/041	. . . {with moving devices}
15/38	. . . involving specific interaction not covered by one or more of groups B01D 15/265 - B01D 15/36	17/042	. . . {by changing the temperature}
15/3804	. . . . . {Affinity chromatography}	17/044	. . . {by changing the pressure}
15/3809	. . . . . {of the antigen-antibody type, e.g. protein A, G, L chromatography}	17/045	. . . {with coalescers}
15/3814	. . . . . {of the substrate or co-factor - enzyme type}	17/047	. . . {with separation aids}
15/3819	. . . . . {of the nucleic acid-nucleic acid binding protein type}	17/048	. . . {by changing the state of aggregation}
15/3823	. . . . . {of other types, e.g. avidin, streptavidin, biotin}	17/06	. Separation of liquids from each other by electricity
15/3828	. . . . . {Ligand exchange chromatography, e.g. complexation, chelation or metal interaction chromatography}	17/08	. {Thickening liquid suspensions by filtration}
15/3833	. . . . . {Chiral chromatography}	17/085	. . {with membranes}
2015/3838	. . . . . {Ligand exchange chromatography, e.g. complexation chromatography, chelation chromatography, metal interaction chromatography}	17/10	. . {with stationary filtering elements}
15/3842	. . . . . {Micellar chromatography}	17/12	. Auxiliary equipment particularly adapted for use with liquid-separating apparatus, e.g. control circuits
15/3847	. . . . . {Multimodal interactions}		WARNING
15/3852	. . . . . {using imprinted phases or molecular recognition; using imprinted phases}		This group is not complete pending reclassification; see also group B01D 17/00
15/3857	. . . . . {Reaction chromatography}	19/00	Degasification of liquids
		19/0005	. {with one or more auxiliary substances}

- 19/001 . . {by bubbling steam through the liquid ([B01D 19/0042](#), [B01D 19/0047](#) and [B01D 19/0052](#) take precedence)}
- 19/0015 . . . {in contact columns containing plates, grids or other filling elements}
- 19/0021 . {by bringing the liquid in a thin layer}
- 19/0026 . . {in rotating vessels or in vessels containing movable parts}
- 19/0031 . {by filtration}
- 19/0036 . {Flash degasification (the other groups take precedence)}
- 19/0042 . {modifying the liquid flow ([B01D 19/0021](#) takes precedence)}
- 19/0047 . . {Atomizing, spraying, trickling}
- 19/0052 . . {in rotating vessels, vessels containing movable parts or in which centrifugal movement is caused ([B01D 19/0026](#) takes precedence)}
- 19/0057 . . . {the centrifugal movement being caused by a vortex, e.g. using a cyclone, or by a tangential inlet}
- 19/0063 . {Regulation, control including valves and floats (for construction and details of valves [F16K](#))}
- 19/0068 . {General arrangements, e.g. flowsheets ([B01D 19/0063](#) takes precedence)}
- 19/0073 . {by a method not covered by groups [B01D 19/0005](#) - [B01D 19/0042](#)}
- 19/0078 . . {by vibration}
- 19/0084 . . {using an electric current}
- 19/0089 . . {using a magnetic field (magnetic separation in general [B03C 1/00](#))}
- 19/0094 . . {by using a vortex, cavitation}
- 19/02 . Foam dispersion or prevention (during boiling [B01B 1/02](#); during fermentation [C12](#))
- 19/04 . . by addition of chemical substances

NOTES

1. Antifoam compositions containing a specific compound as the main substance are only classified in the, for this specific compound, corresponding [B01D 19/0404](#) subgroup (e.g. polysiloxanes receive the classification [B01D 19/0409](#)); when the specific compound(s) is (are) not the main substance, then the attributed classification for this compound(s) is a combination of [B01D 19/0404](#) + the corresponding [B01D 19/0404](#) subgroup(s), (e.g. hydrocarbons containing silica are classified in [B01D 19/0404](#) + [B01D 19/0409](#)).

If the main substance is a mixture containing more than one specific compound, then the attributed classification is a combination of the corresponding [B01D 19/0404](#) subgroup of the specific compounds, (e.g. benzene sulfonate and an amide are classified in [B01D 19/0413](#) + [B01D 9/02](#)).

2. In groups [B01D 19/0404](#) - [B01D 19/0495](#), in the absence of an indication to the contrary, an invention is classified in the last appropriate place].

- 19/0404 . . . {characterised by the nature of the chemical substance}
- 19/0409 {compounds containing Si-atoms}
- 19/0413 {compounds containing N-atoms}

- 19/0418 {compounds containing P-atoms}
- 19/0422 {compounds containing S-atoms}
- 19/0427 {compounds containing halogen-atoms}
- 19/0431 {containing aromatic rings}
- 19/0436 {with substituted groups}
- 19/044 {which contain Si-atoms}
- 19/0445 {which contain N-atoms}
- 19/045 {which contain P-atoms}
- 19/0454 {which contain S-atoms}
- 19/0459 {which contain halogen-atoms}
- 19/0463 {containing rings other than aromatic rings}
- 19/0468 {with substituted groups}
- 19/0472 {which contain Si-atoms}
- 19/0477 {which contain N-atoms}
- 19/0481 {which contain P-atoms}
- 19/0486 {which contain S-atoms}
- 19/049 {which contain halogen-atoms}
- 19/0495 {containing hetero rings}

21/00

Separation of suspended solid particles from liquids by sedimentation ({separation of ores or the like by sedimentation [B03B 5/48](#) - [B03B 5/60](#)}; differential sedimentation [B03D 3/00](#); {purification of water, waste water, sewage or sludge [C02F](#), e.g.} devices for separating or removing fatty or oily substances or similar floating material from water, waste water or sewage [C02F 1/40](#))

WARNING

The following groups are not complete:

[B01D 21/0006](#), see also [B01D 21/00](#)
[B01D 21/0018](#), see also [B01D 21/00](#)
[B01D 21/0054](#), see also [B01D 21/00](#)
[B01D 21/0057](#), see also [B01D 21/00](#)
[B01D 21/003](#), see also [B01D 21/00](#)
[B01D 21/0036](#), see also [B01D 21/00](#)
[B01D 21/0087](#), see also [B01D 21/00](#)
[B01D 21/2416](#), see also [B01D 21/2405](#)
[B01D 21/2422](#), see also [B01D 21/2405](#)
[B01D 21/2427](#), see also [B01D 21/24](#)
[B01D 21/2433](#), see also [B01D 21/24](#)
[B01D 21/262](#), see also [B01D 21/26](#)
[B01D 21/265](#), see also [B01D 21/26](#)
[B01D 21/267](#), see also [B01D 21/26](#)
[B01D 21/28](#), see also [B01D 21/28](#)
[B01D 21/302](#), see also [B01D 21/30](#)
[B01D21/30B](#), see also [B01D 21/30](#)

- 21/0003 . {Making of sedimentation devices, structural details thereof, e.g. prefabricated parts}
- 21/0006 . {Settling tanks provided with means for cleaning and maintenance}
- 21/0009 . {Settling tanks making use of electricity or magnetism (electric ultra filters [B01D 61/425](#); filters making use of electricity or magnetism [B01D 35/06](#); magnetic or electrostatic separation [B03C](#))}
- 21/0012 . {Settling tanks making use of filters, e.g. by floating layers of particulate material}
- 21/0015 . {Controlling the inclination of settling devices}

- 21/0018 . . {provided with a pump mounted in or on a settling tank}
 - 21/0021 . . {provided with a jet pump}
 - 21/0024 . . {Inlets or outlets provided with regulating devices, e.g. valves, flaps ([B01D 21/24 takes precedence](#))}
 - 21/0027 . . {Floating sedimentation devices}
 - 21/003 . . {Sedimentation tanks provided with a plurality of compartments separated by a partition wall ([B01D 21/0039 takes precedence](#))}
 - 21/0033 . . {Vertical, perforated partition walls ([B01D 21/2422 takes precedence](#))}
 - 21/0036 . . {Horizontal partition walls}
 - 21/0039 . . {Settling tanks provided with contact surfaces, e.g. baffles, particles}
 - 21/0042 . . {Baffles or guide plates}
 - 21/0045 . . {Plurality of essentially parallel plates}
 - 21/0048 . . {Plurality of plates inclined in alternating directions}
 - 21/0051 . . {Plurality of tube like channels}
 - 21/0054 . . {Plates in form of a coil}
 - 21/0057 . . {with counter-current flow direction of liquid and solid particles}
 - 21/006 . . {with co-current flow direction of liquid and solid particles}
 - 21/0063 . . {with cross-flow flow direction of liquid and solid particles}
 - 21/0066 . . {with a meandering flow pattern of liquid or solid particles}
 - 21/0069 . . {Making of contact surfaces, structural details, materials therefor}
 - 21/0072 . . . {Means for adjusting, moving or controlling the position or inclination of the contact surfaces, e.g. for optimising the particle-liquid separation, for removing the settled particles, for preventing fouling}
 - 21/0075 . . . {Contact surfaces having surface features}
 - 21/0084 . . {Enhancing liquid-particle separation using the flotation principle ([flotation in general B03D 1/00](#))}
 - 21/0087 . . {Settling tanks provided with means for ensuring a special flow pattern, e.g. even inflow or outflow ([B01D 21/2411 takes precedence](#))}
 - 21/009 . . {Heating or cooling mechanisms specially adapted for settling tanks}
 - 21/0093 . . {Mechanisms for taking out of action one or more units of a multi-unit settling mechanism}
 - 21/0096 . . {Safety mechanisms specially adapted for settling tanks ([B01D 21/22 takes precedence](#))}
 - 21/01 . . using flocculating agents ([for purifying water C02F 1/52; for liquid radioactive waste G21F 9/10](#))
 - 21/02 . . Settling tanks {with single outlets for the separated liquid}
 - 21/04 . . with moving scrapers
 - 21/06 . . . with rotating scrapers
 - 21/08 . . provided with flocculating compartments
 - 21/10 . . {Settling tanks with multiple outlets for the separated liquids}
 - 21/12 . . {with moving scrapers}
 - 21/14 . . . {with rotating scrapers}
 - 21/16 . . {provided with flocculating compartments}
 - 21/18 . . Construction of the scrapers or the driving mechanisms for settling tanks
 - 21/183 . . {with multiple scraping mechanisms}
 - 21/186 . . {with two or more scrapers fixed at different heights on a central rotating shaft}
 - 21/20 . . Driving mechanisms
 - 21/22 . . Safety mechanisms
 - 21/24 . . Feed or discharge mechanisms for settling tanks
 - 21/2405 . . {Feed mechanisms for settling tanks}
 - 21/2411 . . . {having a tangential inlet}
 - 21/2416 . . . {Liquid distributors with a plurality of feed points}
 - 21/2422 {Vertically arranged feed points}
 - 21/2427 . . {The feed or discharge opening located at a distant position from the side walls}
 - 21/2433 . . {Discharge mechanisms for floating particles}
 - 21/2438 . . . {provided with scrapers on the liquid surface for removing floating particles}
 - 21/2444 . . {Discharge mechanisms for the classified liquid}
 - 21/245 . . {Discharge mechanisms for the sediments}
 - 21/2455 . . . {Conveyor belts}
 - 21/2461 . . . {Positive-displacement pumps; Screw feeders; Trough conveyors}
 - 21/2466 . . . {Mammoth pumps, e.g. air lift pumps}
 - 21/2472 . . . {Means for fluidising the sediments, e.g. by jets or mechanical agitators}
 - 21/2477 . . . {Centrifugal pumps}
 - 21/2483 . . . {Means or provisions for manually removing the sediments}
 - 21/2488 . . {bringing about a partial recirculation of the liquid, e.g. for introducing chemical aids}
 - 21/2494 . . {provided with means for the removal of gas, e.g. noxious gas, air}
 - 21/26 . . Separation of sediment aided by centrifugal force {or centripetal force} ([centrifuges B04B; cyclones B04C](#))
 - 21/262 . . {by using a centrifuge}
 - 21/265 . . {by using a vortex inducer or vortex guide, e.g. coil ([B01D 21/0054 takes precedence](#))}
 - 21/267 . . {by using a cyclone}
 - 21/28 . . Mechanical auxiliary equipment for acceleration of sedimentation, e.g. by vibrators or the like
 - 21/283 . . {Settling tanks provided with vibrators}
 - 21/286 . . {Means for gentle agitation for enhancing flocculation}
 - 21/30 . . Control equipment
- WARNING**
- Groups [B01D 21/302 - B01D 21/34](#) are not complete, see also [B01D 21/30](#)
- 21/302 . . {Active control mechanisms with external energy, e.g. with solenoid valve}
 - 21/305 . . {Control of chemical properties of a component, e.g. control of pH}
 - 21/307 . . {Passive control mechanisms without external energy, e.g. using a float}
 - 21/32 . . Density control of clear liquid or sediment, e.g. optical control; {Control of physical properties}
 - 21/34 . . Regulation of feed distribution; Regulation of liquid level; {Control of process parameters}

Filtration; Filtering material, regeneration thereof ({aquarium filters [A01K 63/04](#); filters for cigars and cigarettes [A24D 3/00](#); filters for coffee or tea-making machines [A47J 31/06](#); filters for frying fat [A47J 37/12](#); filters for suction cleaners [A47L 9/10](#) } ; blood or infusion liquid filters [A61M 5/165](#); {liquid-liquid separation, e.g. for filtering elements made hydrophilic or hydrophobic, [B01D 12/00](#), [B01D 17/00](#), [B01D 43/00](#); filtering material and its regeneration, as well as filtering aids, [B01D 39/00](#); gas or air filters in general [B01D 46/00](#); filtration devices for laboratory use [B01L](#); "dewatering" ore or coal slurry [B03B 5/48](#); magnetic filters [B03C 1/00](#) } ; screens or sieves per se [B07B 1/00](#); {filters for lubricating and cooling systems in turning, boring or milling machines [B23Q 11/10](#); filters for cooling systems in grinding machines [B24B 55/00](#) } ; extrusion filters [B29C 47/68](#); {filter presses [B30B 9/02](#); purification of process water, drinking water and waste water [C02F](#); filters for alcoholic beverages [C12H 1/00](#) } ; filtering spinning solution or melt [D01D 1/10](#); {filters for washing machines [D06F 39/10](#); filters or strainers for papermaking [D21D](#); filters in water collecting systems [E03B 3/18](#), [E03B 7/07](#); subsoil filters for boreholes [E21B 43/02](#); air filters for internal-combustion engines [F02M 35/02](#); filters for pumps [F04B 39/16](#), [F04D 29/70](#); filters in pipe systems [F16L 55/24](#) } ; filtration of lubricants [F16N 39/06](#); {filters for volume measuring apparatus [G01F 15/12](#)})

- 23/00** **{Gravity filters (with moving filtering elements [B01D 33/0035](#))}**
- 23/005 . {making filtering elements, not provided for elsewhere (see also [B01D 25/001](#), [B01D 27/005](#), [B01D 29/0093](#))}
- 23/02 . {with fixed filter bodies}
- 23/04 . . {with filter bags filtering from the inside}
- 23/06 . . {with rigid tubular bodies}
- 23/08 . . {with saucer-shaped filtering elements}
- 23/10 . {with loose filter material}
- 23/12 . . {with filtering material supported on louvred sides}
- 23/14 . . {carbon filters}
- 23/16 . . {Sand or gravel filters (filterbed-basin filters, small bed filters, e.g. in closed housing [B01D 23/10](#))}
- 23/18 . . {Bottoms of filter beds}
- 23/20 . {Feed or discharge devices (nozzles [B05B](#))}
- 23/205 . . {Special adaptation of spray heads therefor}
- 23/24 . {Regeneration of the filter material in the filter}
- 23/26 . {integrally combined with devices for controlling the filtration (shutting-off elements, changing over from one element to another [B01D 35/12](#), [B01D 35/14](#); control of filtration processes [B01D 37/04](#))}
- 23/28 . {Filter funnels; Holders therefor (funnels in general [B67C](#); funnels for laboratory use [B01L](#); coffee or tea strainers or apparatus [A47J 31/00](#) - [A47J 31/06](#))}
- 24/00** **Filters comprising loose filtering material, i.e. filtering material without any binder between the individual particles or fibres thereof ([B01D 27/02](#) takes precedence)**

WARNING

See WARNING after subclass title, particularly items (7), (8) and (14)

- 24/001 . {Making filter elements (not provided for elsewhere)(see also [B01D 25/001](#), [B01D 27/005](#), [B01D 29/012](#), [B01D 29/111](#), [B01D 33/0093](#))}

- 24/002 . {with multiple filtering elements in parallel connection}
- 24/004 . . {arranged concentrically or coaxially}
- 24/005 . . {Filters being divided into a plurality of cells or compartments ([B01D 24/004](#) takes precedence)}
- 24/007 . {with multiple filtering elements in series connection}
- 24/008 . . {arranged concentrically or coaxially}
- 24/02 . with the filter bed stationary during the filtration
- 24/04 . . the filtering material being clamped between pervious fixed walls ([B01D 24/10](#), [B01D 24/20](#) take precedence)
- 24/042 . . . {the filtering material being held in a flexible porous bag}
- 24/045 . . . {with at least one flat vertical wall}
- 24/047 {with vertical tubes distributing the liquid to be filtered or for collecting filtrate}
- 24/06 . . . the pervious walls comprising a series of louvres or slots
- 24/08 . . . the filtering material being supported by at least two pervious coaxial walls
- 24/10 . . the filtering material being held in a closed container
- 24/105 . . . {downward filtration without specifications about the filter material supporting means}
- 24/12 . . . Downward filtration, the filtering material being supported by pervious surfaces ([B01D 24/18](#) takes precedence)
- 2024/125 {spray heads specially adapted therefor}
- 24/14 . . . Downward filtration, the container having distribution or collection headers or pervious conduits ([B01D 24/18](#) takes precedence)
- 2024/145 {spray heads specially adapted therefor}
- 24/16 . . . Upward filtration ([B01D 24/18](#) takes precedence)
- 2024/162 {spray heads specially adapted therefor}
- 24/165 {the filtering material being supported by pervious surfaces}
- 24/167 {the container having distribution or collection headers or pervious conduits}
- 24/18 . . . Combined upward and downward filtration
- 24/183 {the filtering material being supported by pervious surfaces}
- 24/186 {the container having distribution or collection headers or pervious conduits}
- 24/20 . . the filtering material being provided in an open container
- 24/205 . . . {Downward filtration without specifications about the filter material supporting means}
- 24/22 . . . Downward filtration, the filter material being supported by pervious surfaces
- 24/24 . . . Downward filtration, the container having distribution or collection headers or pervious conduits
- 24/26 . . . Upward filtration
- 24/263 {the filtering material being supported by pervious surfaces}
- 24/266 {the container having distribution or collection headers or pervious conduits}
- 24/28 . with the filter bed moving during the filtration ([with the filter bed fluidised \[B01D 24/36\]\(#\)](#))
- 24/30 . . Translation
- 24/305 . . . {Vibrations}
- 24/32 . . Rotation

- 24/34 . . with the filtering material and its pervious support moving ([tipping buckets, trays or like sections B01D 33/327](#))
- 24/36 . . with the filter bed fluidised during the filtration ([with the filter bed being stationary B01D 24/02](#))
- 24/38 . . Feed or discharge devices
- 24/383 . . {using multiple way valves}
- 24/386 . . {internal recirculation}
- 24/40 . . for feeding
- 24/402 . . . {containing fixed liquid displacement elements or cores}
- 24/405 . . . {Special treatment of the feed stream before contacting the filtering material, e.g. cutting ([B01D 35/24](#), [B01D 37/02](#), [B01D 37/03](#) take precedence)}
- 24/407 . . . {provoking a tangential stream}
- 24/42 . . for discharging filtrate
- 24/425 . . . {containing fixed liquid displacement elements or cores}
- 24/44 . . for discharging filter cake, e.g. chutes
- 24/46 . . Regenerating the filtering material in the filter ([B01D 24/44](#) takes precedence)
- 24/4605 . . {by scrapers, brushes, nozzles or the like placed on the cake-side of the stationary filtering material and only contacting the external layer ([B01D 24/4631](#) takes precedence)}
- 24/461 . . . {by scrapers}
- 24/4615 . . . {by brushes}
- 24/4621 . . . {by nozzles acting on the cake side of the filter material, or by fluids acting in co-current direction with the feed stream}
- 24/4626 . . {Construction of spray heads specially adapted for regeneration of the filter material or for filtrate discharging}
- 24/4631 . . {Counter-current flushing, e.g. by air}
- 24/4636 . . . {with backwash shoes; with nozzles}
- 24/4642 . . . {with valves, e.g. rotating valves}
- 24/4647 {with a rectilinear movement of the closing means}
- 24/4652 . . . {by using gasbumps}
- 24/4657 . . . {by using membranes}
- 24/4663 . . . {by using pistons}
- 24/4668 . . {by moving the filtering element ([B01D 24/4605](#) and [B01D 24/4631](#) take precedence)}
- 24/4673 . . . {using rotary devices or vibration mechanisms, e.g. stirrers}
- 24/4678 . . . {using free vortex flow}
- 24/4684 . . . {using spray devices}
- 24/4689 . . . {Displacement of the filtering material to a compartment of the filtering device for regeneration}
- 24/4694 . . {containing filter material retaining means (e.g. screens, balls) placed on the surface of the filter material}
- 24/48 . . integrally combined with devices for controlling the filtration
- 24/4807 . . {Handling the filter cake for purposes other than regenerating}
- 24/4815 . . . {for washing}
- 24/4823 . . . {for drying}
- 24/483 {by compression}
- 24/4838 {by gases or by heating}
- 24/4846 . . . {Retarding cake deposition on the filter during the filtration period, e.g. using stirrers ([B01D 24/407](#) takes precedence)}
- 24/4853 . . {by clearness or turbidity measuring}
- 24/4861 . . {by flow measuring}
- 24/4869 . . {by level measuring}
- 24/4876 . . {in which the filtering elements are moved between filtering operations; particular measures for removing or replacing the filtering elements ([B01D 24/46](#), [B01D 24/4807](#) take precedence)}
- 24/4884 . . {by pressure measuring}
- 24/4892 . . {by temperature measuring}
- 25/00** **Filters formed by clamping together several filtering elements or parts of such elements (disc filters [B01D 29/39](#))**
- WARNING**
- See WARNING after subclass title, particularly items (7), (8), (12), (13) and (14)
- 25/001 . . {Making filtering elements ([not provided for elsewhere; see also B01D 24/001](#), [B01D 27/005](#), [B01D 29/012](#), [B01D 29/111](#), [B01D 33/0093](#))}
- 25/002 . . {Clamping devices ([B01D 25/12](#) and subgroups take precedence)}
- 25/003 . . {integrally combined with devices for controlling the filtration}
- 25/004 . . {by clearness or turbidity measuring}
- 25/005 . . {by flow measuring}
- 25/006 . . {by level measuring}
- 25/007 . . {by pressure measuring}
- 25/008 . . {by temperature measuring}
- 25/02 . . in which the elements are pre-formed independent filtering units, e.g. modular systems
- 25/04 . . {with screens or sheets, e.g. cloths, paper ([B01D 25/12](#) takes precedence)}
- 25/06 . . {with loose, granular or fibrous filtering material}
- 25/08 . . {with rigid self-supporting filtering elements}
- 25/10 . . {in which the suspended particles form the filtering medium}
- 25/12 . . Filter presses, i.e. of the plate and frame type ({[filter presses in which the liquid is removed by pressing-out solid matter B30B](#)})
- 25/121 . . . {with bandshaped filtering elements intermittently entrained between the press plates, the lateral sides of the elements being clamped between two successive plates or between a plate and a successive frame during the filtration period, e.g. zigzag endless filter belts}
- 25/122 . . {Construction of the plates}
- 25/124 . . {Pressing-out operation after filtration, e.g. of the cake ([presses in general B30](#))}
- 25/125 . . {Opening and/or closing and/or pressure applying devices or means}
- 25/127 . . . with one or more movable filter bands arranged to be clamped between the press plates or between a plate and a frame during filtration, e.g. zigzag endless filter bands ([B01D 25/172](#), [B01D 25/176](#), [B01D 25/19](#) take precedence)
- 25/1275 . . . {the plates or the frames being placed in a non-vertical position}
- 25/14 . . {Clamping means clamping of filter cloth or similar securing means}

- 25/16 . {Edge filtering elements, i.e. using contiguous impervious surfaces}
- 25/164 . . Chamber-plate presses, i.e. the sides of the filtering elements being clamped between two successive filtering plates ([B01D 25/127](#), [B01D 25/172](#), [B01D 25/176](#), [B01D 25/19](#) take precedence)
- 25/1645 . . . {the plates being placed in a non-vertical position}
- 25/172 . . Plate spreading means (removal of filter cakes [B01D 25/32](#))
- 25/176 . . attaching the filter element to the filter press plates, e.g. around the central feed hole in the plates
- 25/18 . . {of flat, stacked bodies}
- 25/19 . . Clamping means for closing the filter press, e.g. hydraulic jacks
- 25/20 . . {of spirally or helically wound bodies}
- 25/21 . . Plate and frame presses ([B01D 25/172](#), [B01D 25/176](#), [B01D 25/19](#) take precedence)
- 25/215 . . . {Construction of the filter plates, frames}
- 25/22 . Cell-type filters
- 25/24 . . Cell-type roll filters
- 25/26 . . Cell-type stack filters
- 25/28 . Leaching or washing filter cakes in the filter {handling the filter cake for purposes other than regenerating}
- 25/281 . . {specially for chamber filter presses}
- 25/282 . . {for drying}
- 25/284 . . . {by gases or by heating}
- 25/285 . . . {by compression using inflatable membranes}
- 25/287 . . . {by compression using pistons}
- 25/288 . . {Retarding cake deposition on the filter during the filtration period, e.g. using stirrers}
- 25/30 . Feeding devices; {Discharge devices}
- 25/302 . . {specially adapted for chamber filter presses}
- 25/305 . . {for discharging filtrate}
- 25/307 . . {with internal recirculation through the filtering element ([B01D 37/02](#) takes precedence)}
- 25/32 . Removal of the filter cakes
- 25/322 . . {specially for chamber filter presses}
- 25/325 . . {counter-current flushing, e.g. by air bumps}
- 25/327 . . . {with backwash shoes, with nozzles}
- 25/34 . . by moving, {e.g. rotating,} the filter elements {([B01D 25/172](#), [B01D 25/19](#) take precedence)}
- 25/343 . . . {Particular measures for replacing or isolating one or more filtering elements; Transport systems for the filtering apparatus ([B01D 25/28](#), [B01D 25/32](#), [B01D 25/346](#), [B01D 25/36](#) take precedence)}
- 25/346 . . . {by vibration}
- 25/36 . . . by centrifugal force
- 25/38 . . by moving parts, e.g. scrapers, contacting stationary filter elements {sprayers}
- 25/383 . . . {Brushes}
- 25/386 . . . {Nozzles}
- 27/00 Cartridge filters of the throw-away type**
- WARNING**
- See WARNING after subclass title, particularly item (14)
- 27/005 . {Making filter elements (not provided for elsewhere)(see also [B01D 24/001](#), [B01D 25/001](#), [B01D 29/012](#), [B01D 29/111](#), [B01D 33/0093](#))}
- 27/02 . with cartridges made from a mass of loose {granular or fibrous} material
- 27/04 . with cartridges made of a piece of unitary material, e.g. filter paper
- 27/06 . . with corrugated, folded or wound material
- 27/07 . . . having a coaxial stream through the filtering element
- 27/08 . Construction of the casing
- 27/10 . Safety devices, e.g. by-passes
- 27/101 . . {Filter condition indicators}
- 27/103 . . {Bypass or safety valves}
- 27/105 . . {Bidirectional working filters}
- 27/106 . . {Anti-leakage or anti-return valves}
- 27/108 . . {Flow control valves; Damping or calibrated passages}
- 27/14 . having more than one filtering element
- 27/142 . . {connected in parallel}
- 27/144 . . . {arranged concentrically or coaxially}
- 27/146 . . {connected in series}
- 27/148 . . . {arranged concentrically or coaxially}
- 29/00 Other filters with filtering elements stationary during filtration, e.g. pressure or suction filters, or filtering elements therefor {([B01D 24/00](#), [B01D 25/00](#) and [B01D 27/00](#) take precedence)}**
- WARNING**
- See WARNING after subclass title, particularly items (7), (8), (9), (10), (12) and (14)
- 29/0002 . {Aspects of other filters with filtering elements stationary during filtration, or of filtering elements thereof}
- 29/0004 . . {Filters with flat filtering elements}
- 29/0006 . . . {Making filtering elements}
- 29/0009 . . . {with curved filtering elements}
- 29/0011 . . . {ring shaped}
- 29/0013 . . {Filters in which the filtering elements are moved between filtering operations; Means specially adapted for removing the filtering elements or introducing new ones; Transport systems specially adapted for the filtering elements}
- 29/0015 . . . {Filtering bands}
- 29/0018 . . {Filters with screens or sheets, e.g. cloth, paper}
- 29/002 . . . {with rigid, self-supporting filtering elements, e.g. of ceramic material}
- 29/0022 . . . {Filters with corrugated, folded, or wound sheets}
- 29/0025 {allowing a coaxial stream through the filtering element (for cartridge filters [B01D 27/06](#))}
- 29/0027 . . {Filters with loose, granular, or fibrous filtering material}
- 29/0029 . . {Bag, cage, hose, tube, sleeve, or like filters}
- 29/0031 . . . {Pressing-out operation after filtration, e.g. by means of membranes (filter presses [per se](#) [B01D 25/12](#))}
- 29/0034 . . . {Filters having flexible filtering material}
- 29/0036 {which is supported}
- 29/0038 {on solid frames with surface grooves and the like}

- 29/004 {to take up a concertina shape during filtration}
- 29/0043 . . . {having rigid self-supporting filtering material ([B01D 29/0068 takes precedence](#))}
- 29/0045 {Edge filtering elements}
- 29/0047 . . . {with multiple filtering units}
- 29/005 {connected in parallel ([B01D 29/0056 takes precedence](#))}
- 29/0052 {connected in series ([B01D 29/0059 takes precedence](#))}
- 29/0054 {arranged concentrically or coaxially}
- 29/0056 {connected in parallel}
- 29/0059 {connected in series}
- 29/0061 . . . {which are vibrated}
- 29/0063 . . . {which are open-ended}
- 29/0065 . . . {Filter candles}
- 29/0068 . . {Filters with hollow discs side-by-side on or around one or more tubes ([with elements moving during filtration B01D 33/0048, B01D 33/0051](#))}
- 29/007 . . . {having filtrate discharge tubes fixed non-perpendicularly to the filtering surfaces}
- 29/0072 . . {Filters integrally combined with devices for controlling the filtration ([for shutting-off elements or changing over from one element to another B01D 35/12, B01D 35/14; controlling filtration processes B01D 37/04](#))}
- 29/0075 . . {Regeneration of the filtering material in the filter ([for two separate filter elements placed in different units B01D 35/12](#))}
- 29/0077 . . . {by scrapers, brushes, nozzles or the like placed on the cake-side of the filters ([B01D 29/0084 takes precedence](#))}
- 29/0079 . . . {Counter-current flushing, e.g. by air bumps}
- 29/0081 {with backwash shoes; with nozzles}
- 29/0084 . . . {by moving the filter element ([B01D 29/0088 takes precedence](#))}
- 29/0086 {by vibration}
- 29/0088 . . . {by centrifugal force}
- 29/009 . . {Filters having feed or discharge devices}
- 29/0093 . {Making filtering elements ([not provided for elsewhere](#))([see also B01D 23/005, B01D 25/001, B01D 27/005](#))}
- 29/0095 . {Flat filtering elements ([B01D 25/12, B01D 25/26, B01D 29/0015, B01D 29/0068 take precedence](#))}
- 29/0097 . {Curved filtering elements, e.g. concave filtering elements}
- 29/01 . . with flat filtering elements ([B01D 29/39 takes precedence](#))
- NOTE**
If the construction of the filtering element itself is of minor importance the document is classified in the subgroups [B01D 29/01, B01D 29/014, B01D 29/016 or B01D 29/018](#); otherwise in the subgroups [B01D 29/03 - B01D 29/07](#)
- 29/012 . . {Making filtering elements (making bag, cage, hose, tube, sleeve or like filtering elements [B01D 29/111](#))}
- 29/014 . . {with curved filtering elements ([construction B01D 29/035, B01D 29/071](#))}
- 29/016 . . {with corrugated, folded or wound filtering elements}
- 29/018 . . {ring shaped}
- 29/03 . . self-supporting
- 29/031 . . . {with corrugated, folded filtering elements}
- 2029/033 . . . {bar screens}
- 29/035 . . . {with curved filtering elements}
- 29/036 . . . {ring shaped}
- 29/038 {with corrugated, folded filtering elements}
- 29/05 . . supported
- 29/055 . . . {ring shaped}
- 29/07 . . . with corrugated, folded or wound filtering sheets
- 29/071 {with curved filtering elements ([B01D 29/072, B01D 29/073 take precedence](#))}
- 29/072 {ring shaped}
- 29/073 {with wound filtering sheets}
- 2029/075 . {Located in a closed housing and comprising scrapers or agitators on the cake side of the filtering elements, e.g. Nutsche- or Rosenmund-type filters for performing multiple step operations}
- 29/085 . Funnel filters; Holders therefor
- 29/09 . . with filtering bands, e.g. movable between filtering operations ([B01D 25/121 takes precedence](#))}
- 29/093 . . {combined with means to fasten the opposite edges of the filtering band together, e.g. Zipper}
- 29/096 . . {Construction of filtering bands or supporting belts, e.g. devices for centering, mounting or sealing the filtering bands or the supporting belts}
- 29/11 . . with bag, cage, hose, tube, sleeve or like filtering elements
- NOTE**
If the construction of the filtering element itself is of minor importance the document is classified in the subgroups [B01D 29/11, B01D 29/114 and B01D 29/117](#), otherwise in the subgroups [B01D 29/13 - B01D 29/356](#)
- 29/111 . . {Making filtering elements}
- 29/112 . . {Ring shaped filters wherein both opposite axial sides are opened and the axial length is shorter than the diameter, e.g. as used in hydraulic transmission systems}
- 29/114 . . {arranged for inward flow filtration ([B01D 29/15, B01D 29/33 take precedence](#))}
- 29/115 . . . {open-ended, the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element}
- 29/117 . . {arranged for outward flow filtration ([B01D 29/23, B01D 29/35 take precedence](#))}
- 29/118 . . . {open-ended}
- 29/13 . . Supported filter elements
- 29/15 . . . arranged for inward flow filtration
- 29/17 open-ended {the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element}
- 29/19 on solid frames with surface grooves or the like
- 29/21 with corrugated, folded or wound sheets
- 29/213 {having a concertina shape}
- 29/216 {with wound sheets}
- 29/23 . . . arranged for outward flow filtration
- 29/232 {with corrugated, folded or wound sheets}

- 29/235 {having a concertina shape}
 - 29/237 {with wound sheets}
 - 29/25 open-ended {the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element}
 - 29/27 Filter bags
 - 29/31 . . . Self-supporting filtering elements
 - 29/33 . . . arranged for inward flow filtration
 - 29/333 {with corrugated, folded filtering elements}
 - 29/336 {open-ended, the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element}
 - 29/35 . . . arranged for outward flow filtration
 - 29/353 {with corrugated, folded filtering elements}
 - 29/356 {open-ended, the arrival of the mixture to be filtered and the discharge of the concentrated mixture are situated on both opposite sides of the filtering element}
 - 29/39 . . . with hollow discs side by side on, or around, one or more tubes, e.g. of the leaf type
 - 29/395 . . . {mounted axially on the tube}
 - 29/41 . . . mounted transversely on the tube
 - 29/413 {divided in sectors}
 - 29/416 {Filtering tables}
 - 29/43 . . . mounted otherwise than transversely on the tube {mounted otherwise than axially on the tube}
 - 29/44 . . . Edge filtering elements, i.e. using contiguous impervious surfaces
 - 29/445 . . . {Bar screens}
 - 29/46 . . . of flat, stacked bodies
 - 29/48 . . . of spirally or helically wound bodies
 - 29/50 . . . with multiple filtering elements, characterised by their mutual disposition (B01D 29/39 takes precedence)
 - 29/52 . . . in parallel connexion
 - 29/54 arranged concentrically or coaxially
 - 29/56 . . . in series connexion
 - 29/58 arranged concentrically or coaxially
 - 29/60 . . . integrally combined with devices for controlling the filtration
 - 29/601 . . . {by clearness or turbidity measuring}
 - 29/603 . . . {by flow measuring}
 - 29/605 . . . {by level measuring}
 - 29/606 . . . {by pressure measuring}
 - 29/608 . . . {by temperature measuring}
 - 29/62 . . . Regenerating the filter material in the filter (devices for taking out of action one or more units of multi-unit filters, e.g. for regeneration, B01D 35/12)
 - 29/64 . . . by scrapers, brushes, {nozzles}, or the like, acting on the cake side of the filtering element
 - 29/6407 {brushes}
 - 29/6415 {with a rotary movement with respect to the filtering element}
 - 29/6423 {with a translational movement with respect to the filtering element}
 - 29/643 {with a combination of movements with respect to the filtering elements}
 - 29/6438 {nozzles}
 - 29/6446 {with a rotary movement with respect to the filtering element}
 - 29/6453 {with a translational movement with respect to the filtering element}
 - 29/6461 {with a combination of movements with respect to the filtering elements}
 - 29/6469 {scrapers}
 - 29/6476 {with a rotary movement with respect to the filtering element}
 - 29/6484 {with a translatory movement with respect to the filtering element}
 - 29/6492 {with a combination of movements with respect to the filtering elements}
 - 29/66 . . . by flushing, e.g. counter-current air-bumps
 - 29/661 {by using gas-bumps}
 - 29/663 {by using membranes}
 - 29/665 {by using pistons}
 - 29/666 {by a stirrer placed on the filtrate side of the filtering element}
 - 29/668 {with valves, e.g. rotating valves for coaxially placed filtering elements}
- NOTE**
- the subgroup covers only counter-current flushing
- 29/68 with backwash arms, shoes or nozzles
 - 29/682 {with a rotary movement with respect to the filtering element}
 - 29/684 {with a translatory movement with respect to the filtering element}
 - 29/686 {with a combination of movements with respect to the filtering elements}
 - 29/688 {with backwash arms or shoes acting on the cake side}
 - 29/70 . . . by forces created by movement of the filter element
 - 29/705 {by compression of compressible filter medium, e.g. foam}
 - 29/72 involving vibrations
 - 29/74 involving centrifugal force
 - 29/76 . . . Handling the filter cake in the filter for purposes other than for regenerating (B01D 29/94 takes precedence)
 - 29/78 for washing
 - 29/80 for drying
 - 29/82 by compression
 - 29/822 {using membranes}
 - 29/824 {using pistons}
 - 29/826 {using rollers}
 - 29/828 {using screws (B01D 29/6476 takes precedence)}
 - 29/84 by gases or by heating
 - 29/843 {by direct contact with a fluid}
 - 29/846 {by indirect heat-exchange}
 - 29/86 . . . Retarding cake deposition on the filter during the filtration period, e.g. using stirrers {(B01D 29/908 takes precedence)}
 - 29/865 {by vibration of the liquid}
 - 29/88 . . . having feed or discharge devices
 - 29/885 {with internal recirculation through the filtering element (B01D 37/02 takes precedence)}
 - 29/90 for feeding
 - 29/902 {containing fixed liquid displacement elements or cores}

- 29/904 . . . {directing the mixture to be filtered on the filtering element in a manner to clean the filter continuously ([B01D 29/115](#), [B01D 29/118](#), [B01D 29/17](#), [B01D 29/25](#), [B01D 29/336](#), [B01D 29/356](#), [B01D 29/902](#), [B01D 29/908](#) take precedence)}
- 29/906 . . . {Special treatment of the feed stream before contacting the filtering element, e.g. cutting ([B01D 35/24](#), [B01D 37/02](#), [B01D 37/03](#) take precedence)}
- 29/908 . . . {provoking a tangential stream}
- 29/92 . . for discharging filtrate
- 29/925 . . . {containing liquid displacement elements or cores}
- 29/94 . . for discharging the filter cake, e.g. chutes
- 29/945 . . . {for continuously discharging concentrated liquid}
- 29/96 . in which the filtering elements are moved between filtering operations; Particular measures for removing or replacing the filtering elements; Transport systems for filters ([B01D 29/09](#), [B01D 29/70](#) take precedence)
- 29/965 . . {Device for changing the inclination of the filtering element}
- 33/00 Filters with filtering elements which move during the filtering operation (filters comprising loose filtering material moving or fluidised during filtration [B01D 24/28](#) - [B01D 24/36](#); centrifuges [B04B](#))**
- WARNING**
- See WARNING after subclass title, particularly items (7), (8), (11) and (14)
- 33/0003 . {Aspects of filters with filtering elements which move during the filtering operation}
- 33/0006 . . {with rotating filtering surfaces (rotating brush filters [B01D 35/10](#))}
- 33/0009 . . . {with cylindrical filtering surfaces, e.g. hollow drums, rotating drum filters for paper making [D21B](#)}
- 33/0012 {Drums provided with cells each independently connected with pressure distributor}
- 33/0016 {Drums with a single compartment}
- 33/0019 {arranged for outward flow filtration}
- 33/0022 {combined with filtering bands or the like}
- 33/0025 {with endless filtering bands}
- 33/0029 {with multiple filtering bands with or without one or more non filtering bands}
- 33/0032 {with loose, granular, or fibrous filtering material}
- 33/0035 {Gravity filters}
- 33/0038 {with external feed}
- 33/0041 . . . {with plane surfaces}
- 33/0045 {with rotary tables}
- 33/0048 {with hollow discs transversely mounted on a hollow shaft}
- 33/0051 {with hollow frames axially mounted on a hollow shaft}
- 33/0054 {with loose, granular, or fibrous filtering material}
- 33/0058 {with filtering surfaces travelling along conveyors (tipping bucket type [B01D 35/08](#); brush filters [B01D 35/10](#))}
- 33/0061 . . {Accessories and components}
- 33/0064 {Devices for handling the filter cake, e.g. washing, discharging}
- 33/0067 {with scrapers, brushes, nozzles or the like placed on the cake-side of the filter ([B01D 33/0074](#) takes precedence)}
- 33/007 {counter-current flushing}
- 33/0074 {with backwash shoes, with nozzles}
- 33/0077 {by moving the filter element}
- 33/008 {by vibration}
- 33/0083 {by centrifugal force}
- 33/0087 . . . {Feed or discharge devices for liquids}
- 33/009 . . . {Pressure distribution systems (pressure distribution systems for filters with tipping buckets or trays [B01D 35/08](#))}
- 33/0093 . {Making filter elements (not provided for elsewhere)(see also [B01D 24/001](#), [B01D 25/001](#), [B01D 27/005](#), [B01D 29/012](#), [B01D 29/111](#))}
- 33/0096 . . {moving rectilinearly (filters [B01D 35/10](#))}
- 33/01 . with translationally moving filtering elements, e.g. pistons ([B01D 33/04](#) - [B01D 33/327](#) take precedence)
- 33/0108 . . {with bag, cage, hose, tube, sleeve or the like filtering elements}
- 33/0116 . . . {arranged for inward flow filtration}
- 33/0125 {open ended}
- 33/0133 . . . {arranged for outward flow filtration}
- 33/0141 {open ended}
- 33/015 . . {with flat filtering elements}
- 33/0158 . . . {self-supporting}
- 33/0166 {Bar screens}
- 33/0175 {with curved filtering elements}
- 33/0183 . . . {supported}
- 33/0191 {with corrugated, folded or wound filtering sheets}
- 33/03 . . with vibrating filter elements
- 33/0307 . . . {with bag, cage, hose, tube, sleeve or the like filtering elements}
- 33/0315 {arranged for inward flow filtration}
- 33/0323 {open ended}
- 33/033 {arranged for outward flow filtration}
- 33/0338 {open ended}
- 33/0346 . . . {with flat filtering elements}
- 33/0353 {self-supporting}
- 33/0361 {Bar screens}
- 33/0369 {with curved filtering elements}
- 33/0376 {supported}
- 33/0384 {with corrugated, folded or wound filtering sheets}
- 33/0392 {with curved filtering elements}
- 33/04 . with filtering bands or the like supported on cylinders which are impervious for filtering
- 33/042 . . {whereby the filtration and squeezing-out take place between at least two filtering bands}
- 33/044 . with filtering bands or the like supported on cylinders which are pervious for filtering
- 33/048 . . with endless filtering bands
- 2033/052 . . . {combined with a compression device}

- 33/056 . . Construction of filtering bands or supporting belts, e.g. devices for centering, mounting or sealing the filtering bands or the supporting belts
- 33/0565 . . {combined with means to fasten the opposite edges of the filtering band together, e.g. Zipper}
- 33/06 . . with rotary cylindrical filtering surfaces, e.g. hollow drums (B01D 33/044 takes precedence; {rotating drums for paper-making D21B})
- 33/067 . . Construction of the filtering drums, e.g. mounting or sealing arrangements
- 2033/07 . . {arranged for inward flow filtration}
- 33/073 . . arranged for inward flow filtration
- 33/09 . . . with surface cells independently connected to pressure distributors
- 33/11 . . arranged for outward flow filtration
- 33/13 . . . with surface cells independently connected to pressure distributors
- 33/15 . . with rotary plane filtering surfaces
- 33/155 . . {the filtering surface being parallel to the rotation axis}
- 33/17 . . with rotary filtering tables (tables divided into separately tiltable buckets, trays or like sections B01D 33/327)
- 33/19 . . . the table surface being divided in successively tilted sectors or cells, e.g. for discharging the filter cake
- 33/21 . . with hollow filtering discs transversely mounted on a hollow rotary shaft
- 33/215 . . . {the filtering discs being fixed inwardly on a rotating construction}
- 33/23 . . . Construction of discs or component sectors thereof
- 33/25 . . with hollow frames axially mounted on a hollow rotary shaft
- 33/27 . . with rotary filtering surfaces, which are neither cylindrical nor planar, e.g. helical surfaces
- 33/275 . . {using contiguous impervious surfaces}
- 33/29 . . the movement of the filter elements being a combination of movements (B01D 33/19 takes precedence)
- 33/31 . . Planetary movement
- 33/327 . . Tipping buckets, trays or like sections
- 33/333 . . with individual filtering elements moving along a closed path (tipping buckets, trays or like sections B01D 33/327)
- 33/35 . . with multiple filtering elements characterised by their mutual disposition ({B01D 33/042} , B01D 33/21 take precedence)
- 33/37 . . in parallel connexion
- 33/39 . . . concentrically or coaxially
- 33/41 . . in series connexion
- 33/42 . . . concentrically or coaxially
- 33/44 . . Regenerating the filter material in the filter (devices for taking out of action one or more units of multi-unit filters, e.g. for regeneration, B01D 35/12)
- 33/46 . . by scrapers, brushes {nozzles} or the like acting on the cake-side of the filtering element ({B01D 33/503 takes precedence})
- 33/461 . . . {brushes}
- 33/463 . . . {nozzles}
- 33/465 . . . {take-off rollers}
- 33/466 . . . {scrapers}
- 33/468 . . . {wires, strands, strings or the like}
- 33/48 . . by flushing, e.g. counter-current air-bumps
- NOTE**
the subgroup covers only counter-current flushing
- 33/50 . . . with backwash arms, shoes or nozzles
- 33/503 {the backwash arms, shoes acting on the cake side}
- 33/506 {with a stirrer placed on the filtrate side}
- 33/52 . . by forces created by movement of the filter element
- 33/54 . . . involving vibrations
- 33/56 . . . involving centrifugal force
- 33/58 . . Handling the filter cake in the filter for purposes other than for regenerating (B01D 33/76 takes precedence) {the filter cake remaining on the filtering element}
- 33/60 . . for washing
- 33/62 . . for drying
- 33/64 . . . by compression
- 33/642 {by pressure belts}
- 33/644 {by pressure plates, membranes}
- 33/646 {by pressure rollers}
- 33/648 {by screws}
- 33/66 . . . by gases or by heating
- 33/663 {by direct contact with a fluid}
- 33/666 {by indirect heat-exchange}
- 33/68 . . Retarding cake deposition on the filter during the filtration period, e.g. using stirrers
- 33/70 . . having feed or discharge devices (B01D 33/82 takes precedence)
- 33/705 . . . {with internal recirculation through the filter}
- 33/72 . . for feeding
- 33/722 . . . {containing fixed liquid displacement elements or cores}
- 33/725 . . . {Special treatment of the feed stream before contacting the filtering element, e.g. cutting (B01D 35/24, B01D 37/02, B01D 37/03 take precedence)}
- 33/727 {provoking a tangential stream}
- 33/74 . . for discharging filtrate
- 33/742 . . . {containing fixed liquid displacement elements or cores}
- 33/745 . . . {Construction of suction casings, pans, or the like}
- 33/747 {moving during the filtration period}
- 33/76 . . for discharging the filter cake, e.g. chutes
- 33/763 . . . {for continuously discharging concentrated liquid}
- 33/766 . . . {Devices for breaking the filter cake, e.g. cutting}
- 33/80 . . Accessories
- 33/801 . . . {Driving means, shaft packing systems or the like}
- 33/802 . . . {Device for changing the inclination of the filtering element}
- 33/803 . . . {in which the filtering elements are moved between filtering operations (B01D 33/52 takes precedence); Particular measures for removing or replacing the filtering elements; Transport systems for filters}
- 33/804 . . . {integrally combined with devices for controlling the filtration}

- 33/805 . . . {by clearness or turbidity measuring}
- 33/806 . . . {by flow measuring}
- 33/807 . . . {by level measuring}
- 33/808 . . . {by pressure measuring}
- 33/809 . . . {by temperature measuring}
- 33/82 . . Means for pressure distribution
- 35/00 Other filtering devices; Auxiliary devices for filtration; Filter housing constructions**
- WARNING**
- See WARNING after subclass title, particularly item (14)
- 35/005 . {Filters specially adapted for use in internal-combustion engine lubrication or fuel systems, not of special interest for [B01D 23/00](#) - [B01D 33/00](#) (internal-combustion engine lubricating systems [F02M](#); lubrication in general [F16N](#))}
- 35/02 . Filters adapted for location in special places, e.g. pipe-lines, pumps, stop-cocks, ([B01D 35/05](#) takes precedence; {water pipe system filters [E03B 3/18](#), [E03B 7/07](#); dirt catchers in sewers [E03F](#); filters or strainers for pipe-lines in general [B08B](#), [E03F](#); object or dirt catching devices in sinks or the like [E03C 1/26](#); suction strainers or filters for pumps [F04B 53/005](#), [F04D 29/70](#)})
- 35/023 . . {Filler pipe filters}
- 35/027 . . rigidly mounted in or on tanks or reservoirs ([B01D 35/04](#) takes precedence)
- 35/0273 . . . {Filtering elements with a horizontal or inclined rotation or symmetry axis submerged in tanks or reservoirs}
- 35/0276 . . . {Filtering elements with a vertical rotation or symmetry axis mounted on tanks or reservoirs}
- 35/04 . . Plug, tap, or cock filters {filtering elements mounted in or on a faucet}
- 35/043 . . . {Reversible faucet filters}
- 35/046 . . . {the filtering element being mounted in the faucet plug}
- 35/05 . Floating filters
- 35/06 . Filters making use of electricity or magnetism (ultrafiltration, microfiltration [B01D 61/14](#); electrodialysis, electro-osmosis [B01D 61/42](#); devices comprising filters and magnetic separators [B03C 1/30](#))
- 35/08 . {Filters with tipping buckets or trays}
- 35/10 . Brush filters {Rotary brush filters}
- 35/12 . Devices for taking out of action one or more units of multi- unit filters, e.g. for regeneration
- 35/14 . Safety devices specially adapted for filtration (preventing or minimising fires or explosions [A62C](#)); Devices for indicating clogging (incorporated in a throw-away filter [B01D 27/10](#))
- 35/143 . . Filter condition indicators
- 35/1435 . . . {with alarm means}
- 35/147 . . Bypass or safety valves
- 35/1475 . . . {Pressure relief valves or pressure control valves}
- 35/15 . . Bidirectional working filters
- 35/153 . . Anti-leakage or anti-return valves
- 35/157 . . Flow control valves: Damping or calibrated passages
- 35/1573 . . . {Flow control valves}
- 35/1576 . . . {Calibrated passages}
- 35/16 . Cleaning-out devices {, e.g. for removing the cake from the filter casing or for evacuating the last remnants of liquid}
- 35/18 . Heating or cooling the filters
- 35/185 . . {comprising a vaporizing unit}
- 35/20 . Vibrating the filters (regenerating filter material by vibrations in filters with stationary filtering elements [B01D 29/72](#); discharging the filter cake by vibrations in filters with moving filtering elements [B01D 33/54](#), [B01D 33/76](#))
- 35/22 . Directing the mixture to be filtered on to the filters in a manner to clean the filters {([B01D 29/904](#) takes precedence)}
- 35/24 . Providing loose granular material to scratch the filters clean
- 35/26 . Filters with built-in pumps {filters provided with a pump mounted in or on the casing (aquarium pumps or filters [A01K 63/04](#))}
- 35/28 . Strainers not provided for elsewhere
- 35/30 . Filter housing constructions
- 35/301 . . {Constructions of two or more housings ([B01D 35/12](#) takes precedence)}
- 35/303 . . . {the housings being modular, e.g. standardised}
- 35/305 . . {with features related to crash tests or crash safety measures}
- 35/306 . . {Filter mounting adapter}
- 35/308 . . {Made of at least two different materials, e.g. metal and plastic}
- 35/31 . . including arrangements for environmental protection, e.g. pressure resisting features
- 35/32 . . . against radiation
- 35/34 . . open-topped ([B01D 35/31](#) takes precedence)
- 36/00 Filter circuits or combinations of filters with other separating devices**
- WARNING**
- See WARNING after subclass title, particularly item (14)
- 36/001 . {Filters in combination with devices for the removal of gas, air purge systems}
- 36/003 . {Filters in combination with devices for the removal of liquids ([B01D 35/185](#) takes precedence)}
- 36/005 . . {Liquid level sensing means, e.g. for water in gasoil-filters}
- 36/006 . . {Purge means}
- 36/008 . . {Means to filter or treat the separated liquid}
- 36/02 . Combinations of filters of different kinds ([B01D 29/50](#), [B01D 33/35](#) take precedence)
- 36/04 . Combinations of filters with settling tanks
- 36/045 . . {Combination of filters with centrifugal separation devices}
- 37/00 Processes of filtration (processes specially adapted for filtering gases [B01D 46/00](#))**
- WARNING**
- See WARNING after subclass title, particularly item (14)
- 37/02 . Precoating the filter medium; Addition of filter aids to the liquid being filtered {(devices for feeding reagents [C02F 1/685](#) and sub-groups; filter aids)}
- 37/025 . . {additives incorporated in the filter}

- 37/03 . . using flocculating agents
- 37/04 . . Controlling the filtration

NOTES

1. If the construction of the filtering element is of minor importance, the documents are classified in this group only
2. Filters integrally combined with devices for controlling the filtration are also classified in the relevant groups for these aspects, e.g. [B01D 24/48](#), [B01D 29/60](#), [B01D 33/804](#)

- 37/041 . . {by clearness or turbidity measuring}
- 37/043 . . {by flow measuring}
- 37/045 . . {by level measuring}
- 37/046 . . {by pressure measuring}
- 37/048 . . {by temperature measuring}

39/00 Filtering material for liquid or gaseous fluids

- 39/02 . . Loose filtering material, e.g. loose fibres
- 39/04 . . Organic material, e.g. cellulose, cotton
- 39/06 . . Inorganic material, e.g. asbestos fibres, glass beads or fibres
- 39/08 . . Filter cloth, i.e. woven, knitted or interlaced material ([metallic B01D 39/10](#))

WARNING

Groups [B01D 39/083](#) and [B01D 39/086](#) are incomplete pending a reorganisation, see also [B01D 39/08](#)

- 39/083 . . {of organic material}
- 39/086 . . {of inorganic material}
- 39/10 . . Filter screens essentially made of metal
- 39/12 . . of wire gauze; of knitted wire; of expanded metal
- 39/14 . . Other self-supporting filtering material; {Other filtering material ([non-woven fabrics in general D04H 3/00](#))}
- 39/16 . . of organic material, e.g. synthetic fibres
- 39/1607 . . . {the material being fibrous ([B01D 39/18](#) takes precedence)}
- 39/1615 {of natural origin}
- 39/1623 {of synthetic origin}
- 39/163 {sintered or bonded}
- 39/1638 . . . {the material being particulate}
- 39/1646 {of natural origin, e.g. cork or peat}
- 39/1653 {of synthetic origin}
- 39/1661 {sintered or bonded}
- 39/1669 . . . {Cellular material}
- 39/1676 {of synthetic origin}
- 39/1684 . . . {Wound filtering material}

WARNING

This group is no longer used for classification of new documents as from December 1, 2011. The backlog of this group is being continuously reclassified to [B01D 39/16](#) and [B01D 2239/0695](#)

- 39/1692 . . . {Other shaped material, e.g. perforated or porous sheets}
- 39/18 . . . the material being cellulose or derivatives thereof ({[cork or peat B01D 39/1646](#)}; making filter paper [D21F 11/14](#))

- 39/20 . . of inorganic material, e.g. asbestos paper, metallic filtering material of non-woven wires ([porous ceramic material {C04B 38/00}](#); [sintering metals C22C 1/04](#); {making porous sintered metal bodies [B22F 3/10](#), honeycomb filters [B01D 46/2418](#), materials used for filtering exhaust gases of an internal combustion engine [F01N 3/022](#), ceramic honeycomb structures [C04B 38/0006](#)})

- 39/2003 {Glass or glassy material}
- 39/2006 {the material being particulate}
- 39/201 {sintered or bonded by inorganic agents}
- 39/2013 {otherwise bonded, e.g. by resins}
- 39/2017 {the material being filamentary or fibrous}
- 39/202 {sintered or bonded by inorganic agents}
- 39/2024 {otherwise bonded, e.g. by resins}
- 39/2027 . . . {Metallic material}
- 39/2031 {the material being particulate}
- 39/2034 {sintered or bonded by inorganic agents}
- 39/2037 {otherwise bonded}
- 39/2041 {the material being filamentary or fibrous}
- 39/2044 {sintered or bonded by inorganic agents}
- 39/2048 {otherwise bonded}
- 39/2051 {Metallic foam}
- 39/2055 . . . {Carbonaceous material ([solid sorbent compositions comprising free carbon B01J 20/20](#))}

WARNING

Groups [B01D 39/2058](#) - [B01D 39/2065](#) are not complete, see also [B01D 39/20](#)

- 39/2058 {the material being particulate}
- 39/2062 {Bonded, e.g. activated carbon blocks}
- 39/2065 {the material being fibrous}
- 39/2068 . . . {Other inorganic materials, e.g. ceramics}
- 39/2072 {the material being particulate or granular}
- 39/2075 {sintered or bonded by inorganic agents}
- 39/2079 {otherwise bonded, e.g. by resins}
- 39/2082 {the material being filamentary or fibrous}
- 39/2086 {sintered or bonded by inorganic agents}
- 39/2089 {otherwise bonded, e.g. by resins}
- 39/2093 {Ceramic foam}
- 39/2096 . . . {Wound materials}

WARNING

This group is no longer used for classification of new documents as from December 1, 2011. The backlog of this group is being continuously reclassified to [B01D 39/20](#) and [B01D 2239/0695](#)

41/00 Regeneration of the filtering material or filter elements outside the filter for liquid or gaseous fluids

- 41/02 . . of loose filtering material
- 41/04 . . of rigid self-supporting filtering material

43/00 Separating particles from liquids, or liquids from solids, otherwise than by sedimentation or filtration ([flotation processes B03D 1/00](#); drying solid materials or objects [F26B](#))

Separating dispersed particles from gases or vapours (suction cleaner filters [A47L 9/10](#); filters for breathing-protection purposes [A62B 23/00](#); filtering air for vehicles [B60H 3/06](#); separating pneumatically-conveyed materials from propelling gas [B65G 53/60](#); exhaust or silencing apparatus for machines or engines having means for removing solid constituents of exhaust [F01N 3/02](#); air cleaners for the intakes of gas-turbine or jet-propulsion plants [F02C 7/05](#), of combustion engines [F02M 35/024](#), of compressors [F04B 39/16](#); filtering in air-conditioning [F24F 3/16](#))

45/00 Separating dispersed particles from gases or vapours by gravity, inertia, or centrifugal forces

- 45/02 . by utilising gravity
- 45/04 . by utilising inertia ([B01D 45/12](#) takes precedence)
- 45/06 . . by reversal of direction of flow
- 45/08 . . by impingement against baffle separators
- 45/10 . . . which are wetted
- 45/12 . by centrifugal forces (centrifuges [B04B](#); cyclones [B04C](#))
- 45/14 . . generated by rotating vanes, discs, drums or brushes
- 45/16 . . generated by the winding course of the gas stream, {the centrifugal forces being generated solely or partly by mechanical means, e.g. fixed swirl vanes}
- 45/18 . Cleaning-out devices

46/00 Filters [, i.e. particle separators] or filtering processes specially modified for separating dispersed particles from gases or vapours (filtering elements [B01D 23/00](#) - [B01D 35/00](#); filtering material [B01D 39/00](#); their regeneration outside the filters [B01D 41/00](#))

- 46/0001 . {Making filtering elements}
- 46/0002 . {Casings; Housings; Frame constructions}
- 46/0004 . . {Details of removable closures, lids, caps or filter heads}
- 46/0005 . . {Mounting of filtering elements within casings, housings or frames ([B01D 46/2422](#) takes precedence)}
- 46/0006 . . . {Filter elements or cartridges installed in a drawer-like manner}
- 46/0008 . . . {Two or more filter elements not fluidly connected positioned in the same housing}
- 46/0009 . . . {Tray-like arrangements of filters in a vessel}
- 46/001 . . {Means for connecting filter housings to supports}
- 46/0012 . . {In-line filters}
- 46/0013 . . {Modules}
- 46/0015 . . {Throw-away type filters}
- 46/0016 . . {Folded frame or housing constructions}
- 46/0017 . . {Filter elements installed in a branch of a pipe, e.g. with an y-shaped tubular housing}
- 46/0019 . {with multiple filtering elements, characterised by their mutual disposition}
- 46/002 . . {connected in parallel}
- 46/0021 . . . {arranged concentrically or coaxially}
- 46/0023 . . {connected in series}
- 46/0024 . . . {arranged concentrically or coaxially}
- 46/0026 . . . {Protecting screens at filter inlet or outlet}
- 46/0027 . {with additional separating or treating functions}
- 46/0028 . . {provided with antibacterial or antifungal means}
- 46/003 . . {including coalescing means for the separation of liquid}

- 46/0031 . . . {with collecting, draining means}
- 46/0032 . . {using electrostatic forces to remove particles, e.g. electret filters}
- 46/0034 . . {using magnetic forces to remove particles}
- 46/0035 . . {by wetting, e.g. using surfaces covered with oil}
- 46/0036 . . {by adsorption or absorption}
- 46/0038 . . {with means for influencing the odor, e.g. deodorizing substances}
- 46/0039 . {with flow guiding by feed or discharge devices}
- 46/0041 . . {for feeding}
- 46/0042 . . . {Use of the inlet flow in order to clean the filter surface}
- 46/0043 . . . {containing fixed gas displacement elements or cores}
- 46/0045 . . . {by using vanes}
- 46/0046 . . . {provoking a tangential stream ([B01D 46/0045](#) takes precedence)}
- 46/0047 . . {for discharging the filtered gas}
- 46/0049 . . . {containing fixed gas displacement elements or cores}
- 46/005 . . {Crossflow filtration, i.e. having an inlet and two outlets}
- 46/0052 . {with filtering elements moving during filtering operation ([B01D 46/22](#), [B01D 46/32](#) take precedence)}
- 46/0053 . . {with vibrating filtering elements}
- 46/0054 . . {with translational movement}
- 46/0056 . . {with rotational movement}
- 46/0057 . {Regenerating the filter material in the filter ([B01D 46/04](#), [B01D 46/48](#) take precedence)}
- 46/0058 . . {Devices for taking out of action one or more units of multi-unit filters}
- 46/006 . . {Chemical processes for the removal of the retained particles, e.g. by burning of processes}
- 46/0061 . . . {making use of catalysts}
- 46/0063 . . . {by heating only}
- 46/0064 . . {by means of acting on the cake side and moving with respect to the filtering elements}
- 46/0065 . . . {by scrapers, brushes, nozzles or the like}
- 46/0067 . . {by acting counter-currently on the filtering surface (e.g. flushing)}
- 46/0068 . . . {with pressurised gas, e.g. pulsed air}
- 46/0069 {Using pressurized gas at supersonic velocities}
- 46/0071 . . . {with backwash arms, shoes or nozzles}
- 46/0072 . . {by forces created by movement of the filter element}
- 46/0073 . . . {involving centrifugal forces}
- 46/0075 . . . {involving vibrations or shaking}
- 46/0076 {involving sonic or ultrasonic waves}
- 46/0078 . . {by electrical means, e.g. for the generation of electrostatic forces in order to reject particles}
- 46/0079 . . {by other means not moving with respect to the filtering elements, e.g. fixed nozzles on the cake side}
- 46/008 . . {Replacing filter elements}
- 46/0082 . . {Washing the filter inside the filter housing}
- 46/0083 . . {Cleaning the filter surface by interrupting suction so that the filter cake falls by gravity}
- 46/0084 . {provided with safety means}
- 46/0086 . . {Filter condition indicators}
- 46/0087 . . {Bypass or safety valves}
- 46/0089 . . {Anti-return means}

46/009	. . {Identification of filter type or position thereof, e.g. by transponders or bar codes}	46/2451	. . . . {characterized by the geometrical structure, shape, pattern or configuration or parameters related to the geometry of the structure, e.g. thickness, cell density}
46/0091	. . {Including arrangements for environmental or personal protection}	46/2455	. . . . {of the whole honeycomb or segments, e.g. elliptic body, octagonal segment, centre of gravity}
46/0093	. . . {against fire or explosion}	46/2459	. . . . {of the plugs, e.g. projections, gaps, length}
46/0094	. . . {against radiation}	46/2462	. . . . {the outer peripheral sealing, e.g. undulations, thickness}
46/0095	. . {Means acting upon failure of the filtering system, e.g. in case of damage of the filter elements; Failsafes}	46/2466	. . . . {of the adhesive layers, i.e. joints between segments, e.g. undulations, thickness}
46/0097	. . {Special means for preventing bypass around the filter, i.e. in addition to usual seals}	46/247	. . . . {of the cells, e.g. diamonds, hexagonal configuration, cell density}
46/0098	. . {Protecting coverages on the filter which is removed before the filter is used, protection of filter, packaging}	46/2474	. . . . {of the walls along the length of the honeycomb, e.g. inclination from inlet to outlet, length, thickness}
46/02	. Particle separators, e.g. dust precipitators, having hollow filters made of flexible material	2046/2477	. . . . {Triangular shapes or configurations}
46/023	. . {Pockets filters, i.e. multiple bag filters mounted on a common frame}	2046/2481	. . . . {Quadrangular shapes or configurations, e.g. square, diamond}
46/026	. . {Means for maintaining a space between filters, e.g. avoiding contact between adjacent filters}	2046/2485	. . . . {Octagonal shapes or configurations}
46/04	. . Cleaning filters	2046/2488	. . . . {Circular shapes or configurations}
46/06	. . with means keeping the working surfaces flat	2046/2492	. . . . {Other shapes or configurations not covered by groups B01D 46/2474 - B01D 2046/2488 }
46/08	. . . the working surfaces forming a star shape	2046/2496	. . . . {The honeycomb filter being defined by mathematical equations}
46/10	. Particle separators, e.g. dust precipitators, using filter plates, sheets, or pads having plane surfaces, {i.e. axial filtering}	46/26	. . rotatable
46/103	. . {Curved filtering elements}	46/28	. Particle separators, e.g. dust precipitators, using filter brushes
46/106	. . {Ring-shaped filtering elements}	46/30	. Particle separators, e.g. dust precipitators, using loose filtering material
46/12	. . in multiple arrangements	46/32	. . the material moving during filtering
46/125	. . . {V-type arrangements}	46/34	. . . not horizontally, e.g. using shoots
46/14	. . arranged in a star shape	46/36	. . . as a substantially horizontal layer, e.g. on rotary tables, drums, conveyor belts
46/16	. . arranged on non-filtering conveyors {or supports}	46/38	. . . as fluidised bed
46/18	. Particle separators, e.g. dust precipitators, using filtering belts	46/40	. Particle separators, e.g. dust precipitators, using edge filters, i.e. using contiguous impervious surfaces
46/185	. . {Construction of filtering belts or supporting belts including devices for centering, mounting or sealing thereof}	46/403	. . {of helically or spirally wound bodies}
46/20	. . the belts combined with drums	46/406	. . {of stacked bodies}
46/22	. . the belts travelling during filtering	46/42	. Auxiliary equipment or operation thereof
46/24	. Particle separators, e.g. dust precipitators, using rigid hollow filter bodies	46/4209	. . {Prevention of static charge, e.g. by grounding}
46/2403	. . {characterised by the physical shape or structure of the filtering element}	46/4218	. . {Influencing the heat transfer which act passively, e.g. isolations, heat sinks, cooling ribs}
46/2407	. . . {Filter candles}	46/4227	. . {Manipulating filters or filter elements, e.g. handles or extracting tools}
46/2411	. . . {Filter cartridges}	46/4236	. . {Reducing noise or vibration emissions}
46/2414	. . . . {End caps including additional functions or special forms}	46/4245	. . {Means for power supply or devices using electrical power in filters or filter elements}
46/2418	. . . {Honeycomb filters (used for filtering exhaust gases of an internal combustion engine F01N 3/022 ; ceramic honeycomb structures per se C04B 38/0006)}	46/4254	. . {Allowing or improving visual supervision, e.g. lamps, transparent parts, windows}
46/2422	. . . . {Mounting of the body within a housing}	46/4263	. . {Means for active heating or cooling}
46/2425	. . . . {characterized by parameters related to the physical properties of the honeycomb structure material, e.g. modulus of rupture, porosity}	46/4272	. . {Special valve constructions adapted to filters or filter elements}
46/2429	. . . . . {of the honeycomb walls or cells}	46/4281	. . {Venturi's or systems showing a venturi effect}
2046/2433	. . . . . {Porosity}	46/429	. . {Means for wireless communication}
2046/2437	. . . . . {Pore diameter}	46/44	. . controlling filtration
46/244	. . . . . {of the plugs}	46/442	. . . {by measuring the concentration of particles}
46/2444	. . . . . {of the outer peripheral sealing}	46/444	. . . {by flow measuring}
46/2448	. . . . . {of the adhesive layers, i.e. joints between segments}	46/446	. . . {by pressure measuring}

- 46/448 . . . {by temperature measuring}
- 46/46 . . . automatic
- 46/48 . . Removing dust other than cleaning filters {, e.g. by using collecting trays}
- 46/50 . . Means for discharging electrostatic potential
- 46/52 . Particle separators, e.g. dust precipitators, using filters embodying folded {corrugated or wound sheet} material
- 46/521 . . {using folded, pleated material}
- 46/522 . . . {with specific folds, e.g. having different lengths}
- 46/523 . . . {with means for maintaining spacing between the pleats or folds}
- 46/525 . . . {which comprises flutes}
- 46/526 {in stacked arrangement}
- 46/527 {in wound arrangement}
- 46/528 . . {using wound sheets ([B01D 46/527](#) takes precedence)}
- 46/54 . Particle separators, e.g. dust precipitators, using ultra-fine filter sheets or diaphragms
- 46/543 . . {using membranes}
- 46/546 . . {using nano- or microfibres}

47/00 Separating dispersed particles from gases, air or vapours by liquid as separating agent ([B01D 45/10](#) takes precedence; fractionating columns or parts thereof [B01D 3/16](#))

- 47/02 . by passing the gas or air or vapour over or through a liquid bath

WARNING

Groups [B01D 47/021](#) - [B01D 47/028](#) are not complete pending reclassification; see also this group

- 47/021 . . {by bubbling the gas through a liquid bath}
- 47/022 . . {by using a liquid curtain ([B01D 47/06](#) takes precedence)}
- 47/024 . . {by impinging the gas to be cleaned essentially in a perpendicular direction onto the liquid surface}
- 47/025 . . {by contacting gas and liquid with a static flow mixer ([B01D 47/14](#) takes precedence)}
- 47/027 . . {by directing the gas to be cleaned essentially tangential to the liquid surface}
- 47/028 . . {by directing the gas through a wetted wire mesh or a perforated plate ([B01D 47/14](#) takes precedence)}
- 47/04 . by passing the gas or air or vapour through foam
- 47/05 . by condensation of the separating agent
- 47/06 . Spray cleaning

WARNING

Groups [B01D 47/063](#) and [B01D 47/066](#) are not complete pending reclassification, see also [B01D 47/06](#)

- 47/063 . . {with two or more jets impinging against each other}
- 47/066 . . {with nozzles using mechanical vibrations}
- 47/08 . . with rotary nozzles

WARNING

Group [B01D 47/085](#) is not complete pending reclassification, see also [B01D 47/08](#)

- 47/085 . . . {with nozzles which are partly immersed in the washing fluid}
- 47/10 . Venturi scrubbers
- 47/12 . Washers with plural different washing sections ([B01D 47/14](#) takes precedence)
- 47/14 . Packed scrubbers (packing elements [B01J 19/30](#), [B01J 19/32](#))
- 47/16 . Apparatus having rotary means, other than rotatable nozzles, for atomising the cleaning liquid
- 47/18 . . with horizontally-arranged shafts

49/00 Separating dispersed particles from gases, air or vapours by other methods

- 49/003 . {by sedimentation}
- 49/006 . {by sonic or ultrasonic techniques}
- 49/02 . by thermal repulsion

50/00 Combinations of devices for separating particles from gases or vapours

- 50/002 . {Combinations of devices relating to groups [B01D 45/00](#) and [B01D 46/00](#)}
- 50/004 . {Combinations of devices relating to groups [B01D 45/00](#) and [B01D 47/00](#)}
- 50/006 . {Combinations of devices relating to groups [B01D 46/00](#) and [B01D 47/00](#)}
- 50/008 . {Combinations of devices relating to groups [B01D 45/00](#) and [B01D 46/00](#) and [B01D 47/00](#)}

51/00 Auxiliary pre-treatment of gases or vapours to be cleaned (preventing dust fires [A62C](#); pretreatment specially adapted for magnetic or electrostatic separation [B03C](#))

- 51/02 . Amassing the particles, e.g. by flocculation {(amassing by electric fields [B03C 3/0175](#))}
- 51/04 . . by seeding, e.g. by adding particles
- 51/06 . . by varying the pressure of the gas or vapour
- 51/08 . . . by sound or ultrasonics
- 51/10 . Conditioning the gas to be cleaned

53/00 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, (recovery of volatile solvents by condensation [B01D 5/00](#); sublimation [B01D 7/00](#); cold traps, cold baffles [B01D 8/00](#); working-up undefined gaseous mixtures obtained by cracking hydrocarbon oils [C10G 70/00](#); cleaning coal gas [C10K](#); working-up of natural gas, or synthetic natural gas, [C10L 3/10](#); separation of difficult-to-condense gases or air by liquefaction [F25J](#); for investigating materials [G01N 30/00](#))

NOTE

Group [B01D 53/34](#) takes precedence over groups [B01D 53/02](#) - [B01D 53/32](#)

- 53/002 . {by condensation}
- 53/005 . {by heat treatment}
- 53/007 . {by irradiation}
- 53/02 . by adsorption, e.g. preparative gas chromatography {(solid sorbent compositions [B01J 20/00](#), preparation of inorganic compounds or elements [C01](#))}

NOTE

B01D 53/02

(continued)

In group [B01D 53/02](#) and subgroups it is desirable to add indexing codes relating to adsorbents, components to be removed, main components in the product gas stream or type of gas or vapour treatment chosen from groups [B01D 2253/00](#), [B01D 2256/00](#), [B01D 2257/00](#) or [B01D 2259/00](#)

- 53/025 . . {with wetted adsorbents; Chromatography (analytical chromatography [G01N 30/00 - G01N 30/96](#); for liquids [B01D 15/08](#))}
- 53/04 . . with stationary adsorbents {([B01D 53/025](#) takes precedence)}
- 53/0407 . . . {Constructional details of adsorbing systems}
- 53/0415 {Beds in cartridges}
- 53/0423 {Beds in columns}
- 53/0431 {Beds with radial gas flow}
- 53/0438 {Cooling or heating systems}
- 53/0446 {Means for feeding or distributing gases}
- 53/0454 . . . {Controlling adsorption ([controlling temperature swing adsorption \[B01D 53/0462\]\(#\), controlling pressure swing adsorption \[B01D 53/047\]\(#\)](#))}

NOTE

In groups [B01D 53/0462](#) and [B01D 53/047 - B01D 53/0476](#) it is desirable to add indexing codes chosen from [B01D 2259/40007 - B01D 2259/40081](#) relating to controlling and processing aspects of pressure or temperature swing adsorption

- 53/0462 . . . {Temperature swing adsorption}
- 53/047 . . . Pressure swing adsorption
- 53/0473 {Rapid pressure swing adsorption}
- 53/0476 {Vacuum pressure swing adsorption}
- 53/053 with storage or buffer vessel
- 53/06 . . with moving adsorbents, e.g. rotating beds {([B01D 53/025](#) takes precedence)}
- 53/08 . . . according to the "moving bed" method
- 53/10 . . . with dispersed adsorbents
- 53/12 according to the "fluidised technique"
- 53/14 . . by absorption
- 53/1406 . . {Multiple stage absorption}
- 53/1412 . . {Controlling the absorption process}
- 53/1418 . . {Recovery of products}
- 53/1425 . . {Regeneration of liquid absorbents}
- 53/1431 . . {Pretreatment by other processes}
- 53/1437 . . . {Pretreatment by adsorption}
- 53/1443 . . . {Pretreatment by diffusion}
- 53/145 . . . {Pretreatment by separation of solid or liquid material}
- 53/1456 . . {Removing acid components}
- 53/1462 . . . {Removing mixtures of hydrogen sulfide and carbon dioxide}
- 53/1468 {Removing hydrogen sulfide}
- 53/1475 {Removing carbon dioxide}
- 53/1481 {Removing sulfur dioxide or sulfur trioxide}
- 53/1487 . . {Removing organic compounds}

- 53/1493 . . {Selection of liquid materials for use as absorbents}

NOTE

In [B01D 53/1493](#) it is desirable to add indexing codes for compositional aspects of absorbents. The codes are chosen from [B01D 2252/00 - B01D 2252/61](#)

- 53/18 . . Absorbing units; Liquid distributors therefor ([B01D 3/16](#), [B01D 3/26](#), [B01D 3/30](#) take precedence; packing elements [B01J 19/30](#), [B01J 19/32](#))
- 53/185 . . . {Liquid distributors}
- 53/22 . . by diffusion (manufacturing semi-permeable membranes [B01D 67/00](#); form, structure or properties of semi-permeable membranes [B01D 69/00](#); material for semi-permeable membranes [B01D 71/00](#))
- 2053/221 . . {Devices}
- 2053/222 . . . {with plates}
- 2053/223 . . . {with hollow tubes}
- 2053/224 {with hollow fibres}
- 53/225 . . {Multiple stage diffusion}
- 53/226 . . . {in serial connexion}
- 53/227 . . . {in parallel connexion}
- 53/228 . . {characterised by specific membranes}
- 53/229 . . {Integrated processes (Diffusion and at least one other process, e.g. adsorption, absorption)}
- 53/24 . . by centrifugal force ([centrifuges \[B04B\]\(#\)](#); [cyclones \[B04C\]\(#\)](#))
- 53/26 . . Drying gases or vapours
- 53/261 . . {by adsorption}
- 53/263 . . {by absorption}
- 53/265 . . {by refrigeration (condensation)}
- 53/266 . . {by filtration}
- 53/268 . . {by diffusion}
- 53/28 . . Selection of materials for use as drying agents
- 53/30 . . Controlling by gas-analysis apparatus ([regulating non electrical variables in general \[G05D\]\(#\)](#))
- 53/32 . . by electrical effects other than those provided for in group [B01D 61/00](#)
- 53/323 . . {by electrostatic effects or by high-voltage electric fields}
- 53/326 . . {in electrochemical cells}
- 53/34 . . Chemical or biological purification of waste gases
- 53/343 . . {Heat recovery}
- 53/346 . . {Controlling the process}
- 53/38 . . Removing components of undefined structure
- 53/40 . . . Acidic components ([B01D 53/44](#) takes precedence)
- 53/42 . . . Basic components ([B01D 53/44](#) takes precedence)
- 53/44 . . . Organic components
- 53/46 . . Removing components of defined structure
- 53/48 . . . Sulfur compounds
- 53/485 {containing only one sulfur compound other than sulfur oxides or hydrogen sulfide}
- 53/50 Sulfur oxides ([B01D 53/60](#) takes precedence)
- 53/501 {by treating the gases with a solution or a suspension of an alkali or earth-alkali or ammonium compound}
- 53/502 {characterised by a specific solution or suspension}

53/504	. . . . . {characterised by a specific device}	53/8643	. . . . . {Removing mixtures of carbon monoxide or hydrocarbons and nitrogen oxides}
53/505	. . . . . {in a spray drying process}	53/8646	. . . . . {Simultaneous elimination of the components (B01D 53/8656 takes precedence)}
53/507	. . . . . {by treating the gases with other liquids}	53/865	. . . . . {characterised by a specific catalyst}
53/508	. . . . . {by treating the gases with solids}	53/8653	. . . . . {characterised by a specific device}
53/52	. . . . . Hydrogen sulfide	53/8656	. . . . . {Successive elimination of the components}
53/523	. . . . . {Mixtures of hydrogen sulfide and sulfur oxides}	53/8659	. . . . . {Removing halogens or halogen compounds}
53/526	. . . . . {Mixtures of hydrogen sulfide and carbon dioxide}	53/8662	. . . . . {Organic halogen compounds}
53/54	. . . . . Nitrogen compounds	53/8665	. . . . . {Removing heavy metals or compounds thereof, e.g. mercury}
53/56	. . . . . Nitrogen oxides (B01D 53/60 takes precedence)	53/8668	. . . . . {Removing organic compounds not provided for in B01D 53/8603 - B01D 53/8665 }
53/565	. . . . . {by treating the gases with solids}	53/8671	. . . . . {Removing components of defined structure not provided for in B01D 53/8603 - B01D 53/8668 }
53/58	. . . . . Ammonia	53/8675	. . . . . {Ozone}
53/60	. . . . . Simultaneously removing sulfur oxides and nitrogen oxides	53/8678	. . . . . {Removing components of undefined structure}
53/62	. . . . . Carbon oxides	53/8681	. . . . . {Acidic components (B01D 53/8687 takes precedence)}
53/64	. . . . . Heavy metals or compounds thereof, e.g. mercury	53/8684	. . . . . {Basic components (B01D 53/8687 takes precedence)}
53/66	. . . . . Ozone	53/8687	. . . . . {Organic components}
53/68	. . . . . Halogens or halogen compounds	53/869	. . . . . {Multiple step processes}
53/685	. . . . . {by treating the gases with solids}	53/8693	. . . . . {After-treatment of removed components}
53/70	. . . . . Organic halogen compounds	53/8696	. . . . . {Controlling the catalytic process}
53/72	. . . . . Organic compounds not provided for in groups B01D 53/48 - B01D 53/70 , e.g. hydrocarbons	53/88	. . . . . Handling or mounting catalysts
53/73	. . . . . After-treatment of removed components	53/885	. . . . . {Devices in general for catalytic purification of waste gases}
53/74	. . . . . General processes for purification of waste gases; Apparatus or devices specially adapted therefor (B01D 53/92 takes precedence)	53/90	. . . . . Injecting reactants
53/75	. . . . . Multi-step processes	53/92	. . . . . of engine exhaust gases (exhaust {or silencing} apparatus {for internal combustion engines, machines or engines in general}, having means for purifying, {rendering innocuous} or otherwise treating exhaust gases F01N 3/00)
53/76	. . . . . Gas phase processes, e.g. by using aerosols	53/922	. . . . . {Mixtures of carbon monoxide or hydrocarbons and nitrogen oxides}
53/77	. . . . . Liquid phase processes	53/925	. . . . . {Simultaneous elimination of carbon monoxide or hydrocarbons and nitrogen oxides}
53/78	. . . . . with gas-liquid contact	53/927	. . . . . {Successive elimination of carbon monoxide or hydrocarbons and nitrogen oxides}
53/79	. . . . . Injecting reactants	53/94	. . . . . by catalytic processes
53/80	. . . . . Semi-solid phase processes, i.e. by using slurries	53/9404	. . . . . {Removing only nitrogen compounds}
53/81	. . . . . Solid phase processes	53/9409	. . . . . {Nitrogen oxides}
53/82	. . . . . with stationary reactants	53/9413	. . . . . {Processes characterised by a specific catalyst}
53/83	. . . . . with moving reactants	WARNING Groups B01D 53/9418 - B01D 53/9427 are not complete pending a reorganisation. See also B01D 53/9413	
53/84	. . . . . Biological processes		
53/85	. . . . . with gas-solid contact		
53/86	. . . . . Catalytic processes		
53/8603	. . . . . {Removing sulfur compounds}	53/9418	. . . . . {for removing nitrogen oxides by selective catalytic reduction [SCR] using a reducing agent in a lean exhaust gas}
53/8606	. . . . . {only one sulfur compound other than sulfur oxides or hydrogen sulfide}		
53/8609	. . . . . {Sulfur oxides}		
53/8612	. . . . . {Hydrogen sulfide}		
53/8615	. . . . . {Mixtures of hydrogen sulfide and sulfur oxides}		
53/8618	. . . . . {Mixtures of hydrogen sulfide and carbon dioxides}		
53/8621	. . . . . {Removing nitrogen compounds}		
53/8625	. . . . . {Nitrogen oxides}		
53/8628	. . . . . {Processes characterised by a specific catalyst}		
53/8631	. . . . . {Processes characterised by a specific device}		
53/8634	. . . . . {Ammonia}		
53/8637	. . . . . {Simultaneously removing sulfur oxides and nitrogen oxides}		
53/864	. . . . . {Removing carbon monoxide or hydrocarbons}		

- 53/9422 {for removing nitrogen oxides by NO_x storage or reduction by cyclic switching between lean and rich exhaust gases (LNT, NSC, NSR)}
- 53/9427 {for removing nitrous oxide}
- 53/9431 {Processes characterised by a specific device}
- 53/9436 {Ammonia}
- 53/944 {Simultaneously removing carbon monoxide, hydrocarbons or carbon making use of oxidation catalysts (three-way-catalysts [TWC] B01D 53/9445)}
- 53/9445 {Simultaneously removing carbon monoxide, hydrocarbons or nitrogen oxides making use of three-way catalysts [TWC] or four-way-catalysts [FWC]}

WARNING

Groups B01D 53/945 and B01D 53/9454 are not complete pending a reorganisation. See also B01D 53/9445

- 53/945 {characterised by a specific catalyst}
- 53/9454 {characterised by a specific device}
- 53/9459 {Removing one or more of nitrogen oxides, carbon monoxide, or hydrocarbons by multiple successive catalytic functions; systems with more than one different function, e.g. zone coated catalysts (layered catalysts with only one function B01D 53/9413, B01D 53/944 or B01D 53/945)}

WARNING

Groups B01D 53/9459 - B01D 53/9477 are not complete pending a reorganisation. See also B01D 53/9459

- 53/9463 {with catalysts positioned on one brick}
- 53/9468 {in different layers}
- 53/9472 {in different zones}
- 53/9477 {with catalysts positioned on separate bricks, e.g. exhaust systems}
- 53/9481 {Catalyst preceded by an adsorption device without catalytic function for temporary storage of contaminants, e.g. during cold start}

WARNING

Groups B01D 53/9486 and B01D 53/949 are not complete pending a reorganisation. See also B01D 53/9481

- 53/9486 {for storing hydrocarbons}
- 53/949 {for storing sulfur oxides}
- 53/9495 {Controlling the catalytic process}
- 53/96 Regeneration, reactivation or recycling of reactants
- 53/965 {including an electrochemical process step}

57/00 Separation, other than separation of solids, not fully covered by a single other group or subclass, e.g. B03C

- 57/02 by electrophoresis (treatment of water, waste water, sewage or sludge by electrophoresis C02F 1/469; electrophoretic production of compounds or non-metals C25B 7/00; investigating or analysing materials by using electrophoresis G01N 27/26)

59/00 Separation of different isotopes of the same chemical element (preventing occurrence of critical conditions when producing fissile material G21; shielding from radioactivity G21F)

- 59/02 Separation by phase transition
- 59/04 by distillation
- 59/06 by fractional melting; by zone melting
- 59/08 by fractional crystallisation, by precipitation, by zone freezing
- 59/10 Separation by diffusion
- 59/12 by diffusion through barriers
- 59/14 Construction of the barrier
- 59/16 by thermal diffusion
- 59/18 by separation jets
- 59/20 Separation by centrifuging
- 59/22 Separation by extracting
- 59/24 by solvent extraction
- 59/26 by sorption, i.e. absorption, adsorption, persorption
- 59/28 Separation by chemical exchange
- 59/30 by ion exchange
- 59/32 by exchange between fluids
- 59/33 involving dual temperature exchange
- 59/34 Separation by photochemical methods
- 59/36 Separation by biological methods
- 59/38 Separation by electrochemical methods (in general B01J)
- 59/40 by electrolysis
- 59/42 by electromigration; by electrophoresis
- 59/44 Separation by mass spectrography (particle spectrometer or separator tubes H01J 49/00)
- 59/46 using only electrostatic fields
- 59/48 using electrostatic and magnetic fields
- 59/50 Separation involving two or more processes covered by different groups selected from groups B01D 59/02, B01D 59/10, B01D 59/20, B01D 59/22, B01D 59/28, B01D 59/34, B01D 59/36, B01D 59/38, B01D 59/44

Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, ultrafiltration; Apparatus specially adapted therefor; Semi-permeable membranes or their production (separation of gases or vapours by diffusion B01D 53/22; treatment of milk by dialysis, reverse osmosis or ultrafiltration A23C 9/142, by electrodialysis A23C 9/144; artificial kidneys A61M 1/14; {manufacture of films of plastics B29, C08J 5/18, of ion-exchange membranes C08J 5/22} ; treatment of water by dialysis, osmosis or reverse osmosis C02F 1/44, by electrodialysis C02F 1/469; apparatus for enzymology or microbiology with dialysis means C12M 1/12; production or purification of sugar juices, e.g. by osmosis, C13D3/16; extraction of sugar from molasses, e.g. by osmosis, C13J1/08; diaphragms for electrolysis C25B 13/00, C25C 7/04; osmosis as energy source F03G 7/00)

NOTE

In groups B01D 61/00 - B01D 71/00, in the absence of an indication to the contrary, classification is made in the last

(convenient place (in respect of [B01D 71/00](#), see also Note (1) following that group)

WARNING

Attention is drawn to the WARNING after the subclass title of [A61M](#)

61/00 Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, ultrafiltration; Apparatus, accessories or auxiliary operations specially adapted therefor

NOTE

In groups [B01D 61/00](#) - [B01D 61/58](#) it is desirable to add the indexing codes relating to process operations and control chosen from groups [B01D 2311/00](#) - [B01D 2311/2696](#), to details relating to membrane modules and apparatus indexing codes chosen from [B01D 2313/00](#) - [B01D 2313/90](#), to details relating to the membrane module operation indexing codes chosen from [B01D 2315/00](#) - [B01D 2315/16](#), to details relating to the module arrangement within a plant or an apparatus indexing codes chosen from [B01D 2317/00](#) - [B01D 2317/08](#) and to details relating to the membrane assembly within one housing indexing codes chosen from [B01D 2319/00](#) - [B01D 2319/06](#)

- 61/002 . {Forward osmosis, direct osmosis (actuators for pressure retarded osmosis [F03G 7/005](#))}
- 61/005 . . {Osmotic agents, draw solutions}
- 61/007 . {Separation by stereostructure, steric separation}
- 61/02 . Reverse osmosis; Hyperfiltration; {Nanofiltration}
- 61/022 . . {comprising multiple reverse osmosis, hyperfiltration or nanofiltration steps}
- 61/025 . . {Reverse osmosis; Hyperfiltration ([B01D 61/022](#) takes precedence)}
- 61/027 . . {Nanofiltration ([B01D 61/022](#) takes precedence)}
- 61/04 . . Feed pretreatment
- 61/06 . . Energy recovery
- 61/08 . . Apparatus therefor
- 61/10 . . Accessories; Auxiliary operations
- 61/12 . . Controlling or regulating
- 61/14 . Ultrafiltration; Microfiltration
- 61/142 . . {comprising multiple ultrafiltration or microfiltration steps}
- 61/145 . . {Ultrafiltration ([B01D 61/142](#) takes precedence)}
- 61/147 . . {Microfiltration ([B01D 61/142](#) takes precedence)}
- 61/16 . . Feed pretreatment
- 61/18 . . Apparatus therefor
- 61/20 . . Accessories; Auxiliary operations
- 61/22 . . Controlling or regulating
- 61/24 . Dialysis; {Membrane extraction (dialysate solution flow [A61M 1/1656](#))}
- 61/243 . . {Dialysis}
- 61/246 . . {Membrane extraction}
- 61/28 . . Apparatus therefor
- 61/30 . . Accessories; Auxiliary operations
- 61/32 . . Controlling or regulating ({Measuring ultrafiltrate during dialysis [A61M 1/16](#))}

- 61/36 . Pervaporation; Membrane distillation; Liquid permeation
- 61/362 . . {Pervaporation}
- 61/364 . . {Membrane distillation}
- 61/366 . . {Apparatus therefor}
- 61/368 . . {Accessories; Auxiliary operations}
- 61/38 . Liquid-membrane separation
- 61/40 . . using emulsion-type membranes
- 61/42 . Electrodialysis; Electro-osmosis {Electro-ultrafiltration}
- 61/422 . . {Electrodialysis}
- 61/425 . . {Electro-ultrafiltration}
- 61/427 . . {Electro-osmosis}
- 61/44 . . Ion-selective electrodialysis
- 61/445 . . . {with bipolar membranes; Water splitting}
- 61/46 . . . Apparatus therefor
- 61/48 having one or more compartments filled with ion-exchange material {, e.g. electrodeionisation}
- 61/485 {Specific features relating to the ion-exchange material}
- 61/50 Stacks of the plate-and-frame type
- 61/52 . . . Accessories; Auxiliary operations
- 61/54 . . . Controlling or regulating
- 61/56 . . Electro-osmotic de-watering
- 61/58 . Multistep processes ({comprising reverse osmosis or hyperfiltration steps [B01D 61/022](#); comprising ultrafiltration or microfiltration steps [B01D 61/142](#))}

NOTE

In group [B01D 61/58](#) specific process steps within the multistep process are indexed by codes chosen from [B01D 61/02](#) - [B01D 61/56](#)

63/00 Apparatus in general for separation processes using semi-permeable membranes

NOTE

In groups [B01D 63/00](#) - [B01D 63/16](#) it is desirable to add the indexing codes relating to membrane modules and apparatus chosen from groups [B01D 2313/00](#) - [B01D 2313/90](#), to details relating to the membrane module operation indexing codes chosen from [B01D 2315/00](#) - [B01D 2315/16](#), to details relating to the module arrangement within a plant or an apparatus indexing codes chosen from [B01D 2317/00](#) - [B01D 2317/08](#) and to details relating to the membrane assembly within one housing indexing codes are chosen from [B01D 2319/00](#) - [B01D 2319/06](#)

- 63/005 . {Microfluidic devices comprising semi-permeable hollow fibre membranes}
- 63/02 . Hollow fibre modules
- 63/021 . . {Manufacturing thereof}
- 63/022 . . . {Encapsulating hollow fibres}
- 63/023 {Materials therefor}
- 63/024 . . {with a single potted end or U-shaped}
- 63/025 . . {Bobbin units}
- 63/026 . . {Wafer type modules or flat-surface type modules}

- 63/027 . . {Twinned or braided type modules}
- 63/028 . . {Microfluidic devices comprising semi-permeable hollow fibre membranes}
- 63/029 . . {Microfluidic devices comprising semi-permeable hollow fibre membranes}
- 63/04 . . comprising multiple hollow fibre assemblies
- 63/043 . . . {with separate tube sheets}
- 63/046 . . . {in separate housings}
- 63/06 . Tubular membrane modules
- 63/061 . . {Manufacturing thereof}
- 63/062 . . {with membranes on a surface of a support tube}
- 63/063 . . . {on the inner surface thereof}
- 63/065 . . . {on the outer surface thereof}
- 63/066 . . {with a porous block having membrane coated passages}
- 63/067 . . {with pleated membranes}
- 63/068 . . {with flexible membrane tubes}
- 63/08 . Flat membrane modules
- 63/081 . . {Manufacturing thereof}
- 63/082 . . {comprising a stack of flat membranes, e.g. plate-and-frame devices}
- 63/084 . . . {at least one flow duct intersecting the membranes}
- 63/085 {specially adapted for two fluids in mass exchange flow}
- 63/087 . . {Single membrane modules}
- 63/088 . . {Microfluidic devices comprising semi-permeable flat membranes}
- 63/10 . Spiral-wound membrane modules
- 63/103 . . {Details relating to membrane envelopes}
- 63/106 . . {Anti-Telescopic-Devices [ATD]}
- 63/12 . . comprising multiple spiral-wound assemblies
- 63/14 . Pleat-type membrane modules
- 63/16 . Rotary, reciprocated or vibrated modules

65/00 Accessories or auxiliary operations, in general, for separation processes or apparatus using semi-permeable membranes

- 65/003 . {Membrane bonding or sealing}
- 65/006 . {Membrane storage}
- 65/02 . Membrane cleaning or sterilisation {; Membrane regeneration}

NOTE

In group [B01D 65/02](#) it is desirable to add the indexing codes relating to membrane cleaning, regeneration, sterilization and prevention of membrane fouling chosen from groups [B01D 2321/00](#) - [B01D 2321/28](#)

- 65/022 . . {Membrane sterilisation}
- 65/025 . . {Removal of membrane elements before washing}
- 65/027 . . {Cleaning of other parts of the apparatus than the membrane}
- 65/04 . . with movable bodies, e.g. foam balls

WARNING

Group [B01D 65/04](#) is no longer used for classification of new documents as from November 1st, 2007. Documents presently classified in this group are in the process of reclassification

- 65/06 . . with special washing compositions

WARNING

Group [B01D 65/06](#) is no longer used for classification of new document as from November 1st, 2007. Documents presently classified in this group are in the process of reclassification

- 65/08 . Prevention of membrane fouling or of concentration polarisation

NOTE

In group [B01D 65/08](#) it is desirable to add the indexing codes relating to membrane cleaning, regeneration, sterilization and prevention of membrane fouling chosen from groups [B01D 2321/00](#) - [B01D 2321/28](#)

- 65/10 . Testing of membranes or membrane apparatus; Detecting or repairing leaks

NOTE

The documents classified in the groups [B01D 67/00](#) - [B01D 71/00](#) are also searchable in a keyword-based electronic off-line database called "MEMBRANE"

- 65/102 . . {Detection of leaks in membranes}
- 65/104 . . {Detection of leaks in membrane apparatus or modules}
- 65/106 . . {Repairing membrane apparatus or modules}
- 65/108 . . . {Repairing membranes}

67/00 Processes specially adapted for manufacturing semi-permeable membranes for separation processes or apparatus

NOTE

In group [B01D 67/00](#) it is desirable to add the indexing codes relating to membrane preparation chosen from groups [B01D 2323/00](#) - [B01D 2323/42](#)

- 67/0002 . {Organic membrane formation}
- 67/0004 . . {by agglomeration of particles, e.g. sintering}
- 67/0006 . . {by chemical reactions (in-situ polymerisation, polycondensation, cross-linking or reaction for manufacturing composite membranes [B01D 69/125](#))}
- 67/0009 . . {by phase separation, sol-gel transition, evaporation or solvent quenching}
- 67/0011 . . . {Casting solutions therefor}
- 67/0013 . . . {Casting processes (hollow fibre membrane manufacturing methods [B01D 69/08](#))}
- 67/0016 . . . {Coagulation}
- 67/0018 . . . {Thermally induced processes}
- 67/002 . . {from melts}
- 67/0023 . . {by inducing porosity into non porous precursor membranes}
- 67/0025 . . . {by mechanical treatment, e.g. pore-stretching}
- 67/0027 {by stretching}
- 67/003 . . . {by selective elimination of components, e.g. by leaching}
- 67/0032 . . . {by elimination of segments of the precursor, e.g. nucleation-track membranes, lithography or laser methods}

- 67/0034 {by micromachining techniques, e.g. using masking and etching steps, photolithography}
- 67/0037 . . {by deposition from the gaseous phase, e.g. CVD, PVD}
- 67/0039 . {Inorganic membrane formation}
- 67/0041 . . {by agglomeration of particles in the dry state, e.g. sintering}
- 67/0044 . . {by chemical reaction}
- 67/0046 . . {by slurry techniques, e.g. die or slip-casting}
- 67/0048 . . {by sol-gel transition}
- 67/0051 . . {by controlled crystallisation, e.g. hydrothermal growth}
- 67/0053 . . {by inducing porosity into non porous precursor membranes}
- 67/0055 . . . {by mechanical treatment}
- 67/0058 . . . {by selective elimination of components, e.g. by leaching}
- 67/006 . . . {by elimination of segments of the precursor, e.g. nucleation-track membranes, lithography or laser methods}
- 67/0062 {by micromachining techniques, e.g. using masking and etching steps, photolithography}
- 67/0065 {by anodic oxidation}
- 67/0067 . . {by carbonisation or pyrolysis}
- 67/0069 . . {by deposition from the liquid phase, e.g. electrochemical deposition ([B01D 67/0046](#) takes precedence)}
- 67/0072 . . {by deposition from the gaseous phase, e.g. sputtering, CVD, PVD}
- 67/0074 . . {from melts}
- 67/0076 . . {Pretreatment of inorganic membrane material prior to membrane formation, e.g. coating of metal powder}
- 67/0079 . {Formation of membranes comprising organic and inorganic components}
- 67/0081 . {After-treatment of organic or inorganic membranes}
- 67/0083 . . {Thermal after-treatment}
- 67/0086 . . {Mechanical after-treatment}
- 67/0088 . . {Physical treatment with compounds, e.g. swelling, coating or impregnation ([involving chemical reactions B01D 67/0093](#))}
- 67/009 . . {with wave-energy, particle-radiation or plasma}
- 67/0093 . . {Chemical modification}
- 67/0095 . . {Drying}
- 67/0097 . . {Storing or preservation}

69/00 Semi-permeable membranes for separation processes or apparatus characterised by their form, structure or properties; Manufacturing processes specially adapted therefor

NOTES

1. In this group, the following term is used with the meaning indicated:
 - "properties" covers those of a mechanical, physical or chemical nature
2. Manufacturing processes, if considered of interest, are also classified in group [B01D 67/00](#)

WARNING

The following sub-groups of [B01D 69/00](#) are incomplete. Documents presently classified in the hierarchically higher groups are in the process of reclassification

[B01D 69/043](#)

[B01D 69/046](#)

[B01D 69/081](#)

[B01D 69/082](#)

[B01D 69/084](#)

[B01D 69/085](#)

[B01D 69/087](#)

[B01D 69/088](#)

[B01D 69/105](#)

[B01D 69/141](#)

[B01D 69/144](#)

[B01D 69/145](#)

[B01D 69/147](#)

[B01D 69/148](#)

- 69/02 . characterised by their properties

NOTE

In group [B01D 69/02](#) it is desirable to add the indexing codes relating to properties of membranes chosen from groups [B01D 2325/00](#) - [B01D 2325/38](#)

- 69/04 . Tubular membranes
- 69/043 . . {characterised by the tube diameter}
- 69/046 . . {characterised by the cross-sectional shape of the tube}
- 69/06 . Flat membranes
- 69/08 . Hollow fibre membranes ([manufacture of hollow fibres D01D 5/24, D01F 1/08](#))
- 69/081 . . {characterised by the fibre diameter}
- 69/082 . . {characterised by the cross-sectional shape of the fibre}
- 69/084 . . {Undulated fibres}
- 69/085 . . {Details relating to the spinneret}
- 69/087 . . {Details relating to the spinning process}
- 69/088 . . . {Co-extrusion; Co-spinning}
- 69/10 . Supported membranes; Membrane supports
- 69/105 . . {Support pretreatment}
- 69/12 . Composite membranes; Ultra-thin membranes
- 69/122 . . {Separate manufacturing of ultra-thin membranes}
- 69/125 . . {In-situ manufacturing by polymerisation, polycondensation, cross-linking, and/or reaction}
- 69/127 . . . {using electrical discharge or plasma-polymerisation}
- 69/14 . Dynamic membranes
- 69/141 . . {Heterogeneous membranes, e.g. containing dispersed material; Mixed matrix membranes}
- 69/142 . . . {with "carriers"}
- 69/144 {containing embedded or bound biomolecules}
- 69/145 . . . {containing embedded catalysts}
- 69/147 . . . {containing embedded adsorbents}
- 69/148 . . . {Organic/inorganic mixed matrix membranes}

71/00 Semi-permeable membranes for separation processes or apparatus characterised by the material; Manufacturing processes specially adapted therefor

NOTES

1. In this group, if the material is a composition it is classified according to the constituent present in the highest proportion. This constituent is classified according to the last place rule (see Note before group [B01D 61/00](#)). If there is more than one constituent present in equal highest proportions, then each of these constituents is classified according to the last place rule
2. Manufacturing processes, if considered of interest, are also classified in group [B01D 67/00](#)

- 71/02 . Inorganic material
- 71/021 . . {Carbon}
- 71/022 . . {Metals}
- 71/024 . . {Oxides}
- 71/025 . . . {Aluminium oxide}
- 71/027 . . . {Silicium oxide}
- 71/028 . . {Molecular sieves, e.g. zeolites, silicalite ([B01D 71/021](#) takes precedence)}
- 71/04 . . Glass
- 71/06 . Organic material
- 71/08 . . Polysaccharides
- 71/10 . . . Cellulose; Modified cellulose
- 71/12 . . . Cellulose derivatives
- 71/14 Esters of organic acids
- 71/16 Cellulose acetate
- 71/18 Mixed esters, e.g. cellulose acetate-butyrate
- 71/20 Esters of inorganic acids, e.g. cellulose nitrate
- 71/22 Cellulose ethers
- 71/24 . . Rubbers

NOTE

In this group the following term is used with the meaning indicated:

- "rubber" covers:
 - a. natural or conjugated diene rubber;
 - b. rubber in general (for specific rubber, see the group provided for such macromolecular compound)

- 71/26 . . Polyalkenes
- 71/28 . . Polymers of vinyl aromatic compounds
- 71/30 . . Polyalkenyl halides
- 71/32 . . . containing fluorine atoms
- 71/34 Polyvinylidene fluoride
- 71/36 Polytetrafluoroethene
- 71/38 . . Polyalkenylalcohols; Polyalkenylesters; Polyalkenylethers; Polyalkenylaldehydes; Polyalkenylketones; Polyalkenylacetals; Polyalkenylketals
- 71/40 . . Polymers of unsaturated acids or derivatives thereof, e.g. salts, amides, imides, nitriles, anhydrides, esters
- 71/42 . . . Polymers of nitriles, e.g. polyacrylonitrile

- 71/44 . . Polymers obtained by reactions only involving carbon-to-carbon unsaturated bonds, not provided for in a single one of groups [B01D 71/26](#) - [B01D 71/42](#)
- 71/46 . . Epoxy resins
- 71/48 . . Polyesters
- 71/50 . . Polycarbonates
- 71/52 . . Polyethers
- 71/54 . . Polyureas; Polyurethanes
- 71/56 . . Polyamides, e.g. polyester-amides
- 71/58 . . Other polymers having nitrogen in the main chain, with or without oxygen or carbon only
- 71/60 . . . Polyamines
- 71/62 . . . Polycondensates having nitrogen-containing heterocyclic rings in the main chain
- 71/64 Polyimides; Polyamide-imides; Polyester-imides; Polyamide acids or similar polyimide precursors
- 71/66 . . Polymers having sulfur in the main chain, with or without nitrogen, oxygen or carbon only
- 71/68 . . . Polysulfones; Polyethersulfones
- 71/70 . . Polymers having silicon in the main chain, with or without sulfur, nitrogen, oxygen or carbon only
- 71/72 . . Macromolecular compounds obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds, not provided for in a single one of the groups [B01D 71/46](#) - [B01D 71/70](#)
- 71/74 . . Natural macromolecular material or derivatives thereof ([B01D 71/08](#), [B01D 71/24](#) take precedence)
- 71/76 . . Macromolecular material not specifically provided for in a single one of groups [B01D 71/08](#) - [B01D 71/74](#) (rubbers in general [B01D 71/24](#))
- 71/78 . . . Graft polymers
- 71/80 . . . Block polymers
- 71/82 . . . characterised by the presence of specified groups, e.g. introduced by chemical after-treatment

2101/00 Types of filters having loose filtering material

- 2101/005 . with a binder between the individual particles or fibres
- 2101/02 . Carbon filters
- 2101/04 . Sand or gravel filters

2201/00 Details relating to filtering apparatus

- 2201/02 . Filtering elements having a conical form
- 2201/04 . Supports for the filtering elements
- 2201/0407 . . Perforated supports on both sides of the filtering element
- 2201/0415 . . Details of supporting structures
- 2201/0423 . . . not in the inner side of the cylindrical filtering elements
- 2201/043 . . Filter tubes connected to plates
- 2201/0438 . . . mounted substantially vertically on plates at the lower side of the filter elements
- 2201/0446 . . . suspended from plates at the upper side of the filter elements
- 2201/0453 . . . positioned between at least two plates
- 2201/0461 . . Springs
- 2201/0469 . . Filter tubes connected to collector tubes

- 2201/0476 . . . mounted substantially vertically on collector tubes at the lower side of the filter elements
- 2201/0484 . . . suspended from collector tubes at the upper side of the filter elements
- 2201/0492 . . . positioned between at least two collector tubes
- 2201/06 . Resilient foam as filtering element
- 2201/08 . Regeneration of the filter
- 2201/081 . . using nozzles or suction devices
- 2201/082 . . . Suction devices placed on the cake side of the filtering element
- 2201/083 . . . Suction devices placed on the filtrate side of the filtering element, e.g. with variable edge filters
- 2201/084 . . . Nozzles placed on the filtrate side of the filtering element
- 2201/085 . . using another chemical than the liquid to be filtered
- 2201/086 . . using fluid streams co-current to the filtration direction
- 2201/087 . . using gas bubbles, e.g. air
- 2201/088 . . Arrangements for killing micro-organisms
- 2201/089 . . using rollers having projections to clear the filter apertures
- 2201/10 . Filtration under gravity in large open drainage basins
- 2201/12 . Pleated filters
- 2201/122 . . with pleats of different length
- 2201/125 . . with non-parallel pleats
- 2201/127 . . with means for keeping the spacing between the pleats
- 2201/14 . Particulate filter materials with a lower density than the liquid mixture to be filtered
- 2201/16 . Valves
- 2201/162 . . with snap, latch or clip connecting means
- 2201/165 . . Multi-way valves
- 2201/167 . . Single-way valves
- 2201/18 . Filters characterised by the openings or pores
- 2201/182 . . for depth filtration
- 2201/184 . . Special form, dimension of the openings, pores of the filtering elements
- 2201/186 . . . Pore openings which can be modified
- 2201/188 . . Multiple filtering elements having filtering areas of different size
- 2201/20 . Pressure-related systems for filters
- 2201/202 . . Systems for applying pressure to filters
- 2201/204 . . Systems for applying vacuum to filters
- 2201/206 . . . by the weight of the liquid in a tube, e.g. siphon, barometric leg
- 2201/208 . . . by venturi systems
- 2201/22 . Filtering bands with supporting discs
- 2201/24 . Tools used for the removal of filters
- 2201/26 . Transport systems for filtering devices
- 2201/265 . . mounted on vehicles
- 2201/28 . Position of the filtering element
- 2201/282 . . Filtering elements with a horizontal rotation or symmetry axis
- 2201/285 . . Filtering elements with a symmetry axis not parallel to the rotation axis
- 2201/287 . . Filtering elements with a vertical or inclined rotation or symmetry axis
- 2201/29 . Filter cartridge constructions
- 2201/291 . . End caps
- 2201/293 . . . Making of end caps
- 2201/295 . . . with projections extending in a radial outward direction, e.g. for use as a guide, spacing means
- 2201/296 . . . Other than having a circular shape
- 2201/298 . . . End caps common to at least two filtering elements
- 2201/30 . Filter housing constructions
- 2201/301 . . Details of removable closures, lids, caps, filter heads
- 2201/302 . . . having inlet or outlet ports
- 2201/303 not arranged concentrically
- 2201/304 . . . Seals or gaskets
- 2201/305 . . . Snap, latch or clip connecting means
- 2201/306 . . . Closures, lids, caps or filter heads forming one element with the filtering element
- 2201/307 . . Filtering elements contained in an insert body mounted in a filter housing (double casing), e.g. to avoid contamination when removing or replacing the filter element
- 2201/308 . . Use of foils, membranes or other means to protect the filter before its use or for protecting the environment, e.g. during removal of the filter
- 2201/309 . . Housings with transparent parts
- 2201/31 . Other construction details
- 2201/313 . . Means for protecting the filter from the incoming fluid, e.g. shields
- 2201/316 . . Standpipes
- 2201/32 . Flow characteristics of the filter
- 2201/325 . . Outward flow filtration
- 2201/34 . Seals or gaskets for filtering elements ([for removable closures, lids, caps or filter heads B01D 2201/304](#))
- 2201/342 . . Axial sealings
- 2201/345 . . Pressurized seals or gaskets
- 2201/347 . . Radial sealings
- 2201/36 . Filtering elements containing a rotating housing construction
- 2201/38 . Preventing rewetting of the filter cake on the filter media
- 2201/40 . Special measures for connecting different parts of the filter
- 2201/4007 . . Use of cam or ramp systems
- 2201/4015 . . Bayonet connecting means
- 2201/4023 . . Means for connecting filter housings to supports
- 2201/403 . . allowing dilatation, e.g. by heat
- 2201/4038 . . for connecting at least two filtering elements together
- 2201/4046 . . Means for avoiding false mounting of different parts
- 2201/4053 . . . using keys
- 2201/4061 . . . between a cartridge and a filter head or manifold
- 2201/4069 . . Magnetic means
- 2201/4076 . . Anti-rotational means
- 2201/4084 . . Snap or Seeger ring connecting means
- 2201/4092 . . Treated sections, e.g. screw
- 2201/44 . Special measures allowing the even or uniform distribution of fluid along the length of a conduit
- 2201/46 . Several filtrate discharge conduits each connected to one filter element or group of filter elements
- 2201/48 . Overflow systems
- 2201/50 . Means for dissipating electrostatic charges
- 2201/52 . Filter identification means
- 2201/54 . Computerised or programmable systems

- 2201/56 . . . Wireless systems for monitoring the filter
- 2201/58 . . . Power supply means for regenerating the filter
- 2201/583 . . . using the kinetic energy of the fluid circulating in the filtering device
- 2201/586 . . . using regenerative sources, e.g. wind, sun
- 2201/60 . . . Shape of non-cylindrical filtering elements
- 2201/602 . . . Oval
- 2201/605 . . . Square or rectangular
- 2201/607 . . . Triangular
- 2201/62 . . . Honeycomb-like
- 2201/64 . . . Filters having floating elements ([floating filters B01D 35/05](#))
- 2202/00 Details concerning evaporation, distillation or condensation**
- 2202/10 . . . Use of a micro-device for separation ([micro-reactors B01J 19/00](#))
- 2202/20 . . . Use of an ionic liquid in the separation process
- 2215/00 Separating processes involving the treatment of liquids with adsorbents**
- 2215/02 . . . with moving adsorbents
- 2215/021 . . . Physically moving or fluidising the adsorbent beads or particles or slurry, excluding the movement of the entire columns
- 2215/022 . . . Physically moving the adsorbent as a whole, e.g. belts, discs or sheets
- 2215/023 . . . Simulated moving beds
- 2215/024 . . . Provisions to deal with recirculated volumes, e.g. in order to regulate flow
- 2215/025 . . . Reekon with dead volumes between sections
- 2215/026 . . . Flushing the injection conduits
- 2215/027 . . . Used at supercritical conditions of temperature or pressure
- 2215/028 . . . Co-current flow
- 2215/029 . . . Centrifuge-like arrangements
- 2221/00 Applications of separation devices**
- 2221/02 . . . Small separation devices for domestic application, e.g. for canteens, industrial kitchen, washing machines
- 2221/04 . . . Separation devices for treating liquids from earth drilling, mining ([separation of well effluents E21B 43/34, flotation in general B03D 1/00](#))
- 2221/06 . . . Separation devices for industrial food processing or agriculture
- 2221/08 . . . Mobile separation devices
- 2221/10 . . . Separation devices for use in medical, pharmaceutical or laboratory applications, e.g. separating amalgam from dental treatment residues ([apparatus for dental treatment A61C 17/04](#))
- 2221/12 . . . Separation devices for treating rain or storm water ([storm water treatment E03F](#))
- 2221/14 . . . Separation devices for workshops, car or semiconductor industry, e.g. for separating chips and other machining residues
- 2221/16 . . . Separation devices for cleaning ambient air, e.g. air along roads or air in cities
- 2239/00 Aspects relating to filtering material for liquid or gaseous fluids**
- 2239/02 . . . Types of fibres, filaments or particles, self-supporting or supported materials
- 2239/0208 . . . Single-component fibres
- 2239/0216 . . . Bicomponent or multicomponent fibres
- 2239/0225 . . . Side-by-side
- 2239/0233 . . . Island-in-sea
- 2239/0241 . . . comprising electrically conductive fibres or particles
- 2239/025 . . . comprising nanofibres ([apparatus incorporating such gas filtering material see B01D 46/546](#))
- 2239/0258 . . . comprising nanoparticles
- 2239/0266 . . . comprising biodegradable or bio-soluble polymers
- 2239/0275 . . . comprising biologically produced plastics, e.g. bioplastics
- 2239/0283 . . . comprising filter materials made from waste or recycled materials
- 2239/0291 . . . comprising swelling polymers
- 2239/04 . . . Additives and treatments of the filtering material
- 2239/0407 . . . comprising particulate additives, e.g. adsorbents ([apparatus incorporating gas filtering material B01D 46/0036](#))
- 2239/0414 . . . Surface modifiers, e.g. comprising ion exchange groups
- 2239/0421 . . . Rendering the filter material hydrophilic
- 2239/0428 . . . Rendering the filter material hydrophobic
- 2239/0435 . . . Electret ([apparatus incorporating such gas filtering material B01D 46/0032](#))
- 2239/0442 . . . Antimicrobial, antibacterial, antifungal additives ([apparatus incorporating such gas filtering material B01D 46/0028](#))
- 2239/045 . . . Deodorising additives
- 2239/0457 . . . Specific fire retardant or heat resistant properties ([apparatus incorporating such gas filtering material B01D 46/0093](#))
- 2239/0464 . . . Impregnants
- 2239/0471 . . . Surface coating material
- 2239/0478 . . . on a layer of the filter
- 2239/0485 . . . on particles
- 2239/0492 . . . on fibres
- 2239/06 . . . Filter cloth, e.g. knitted, woven non-woven; self-supported material
- 2239/0604 . . . Arrangement of the fibres in the filtering material
- 2239/0609 . . . Knitted
- 2239/0613 . . . Woven
- 2239/0618 . . . Non-woven
- 2239/0622 . . . Melt-blown
- 2239/0627 . . . Spun-bonded
- 2239/0631 . . . Electro-spun
- 2239/0636 . . . Two or more types of fibres present in the filter material
- 2239/064 . . . The fibres being mixed
- 2239/0645 . . . Arrangement of the particles in the filtering material
- 2239/065 . . . More than one layer present in the filtering material ([apparatus incorporating such gas filtering material B01D 2275/10](#))
- 2239/0654 . . . Support layers
- 2239/0659 . . . The layers being joined by needling
- 2239/0663 . . . The layers being joined by hydro-entangling
- 2239/0668 . . . The layers being joined by heat or melt-bonding
- 2239/0672 . . . The layers being joined by welding
- 2239/0677 . . . by spot-welding
- 2239/0681 . . . The layers being joined by gluing
- 2239/0686 . . . by spot-gluing
- 2239/069 . . . Special geometry of layers

2239/0695 . . . Wound layers ([apparatus incorporating such gas filtering material B01D 2275/105](#))

WARNING

This group is not complete, see also [B01D 39/1684](#)

2239/08 . . Special characteristics of binders
 2239/083 . . Binders between layers of the filter
 2239/086 . . Binders between particles or fibres
 2239/10 . . Filtering material manufacturing
 2239/12 . . Special parameters characterising the filtering material
 2239/1208 . . Porosity ([apparatus incorporating such gas filtering material B01D 2275/30 - B01D 2275/307](#))
 2239/1216 . . Pore size
 2239/1225 . . Fibre length
 2239/1233 . . Fibre diameter
 2239/1241 . . Particle diameter
 2239/125 . . Size distribution
 2239/1258 . . Permeability
 2239/1266 . . Solidity
 2239/1275 . . Stiffness
 2239/1283 . . Stability index
 2239/1291 . . Other parameters

2247/00 Details relating to the separation of dispersed particles from gases, air or vapours by liquid as separating agent

2247/02 . . Enhancing the particle separation by electrostatic or magnetic effects ([B01D 2247/102 takes precedence; electrostatic or magnetic separation B03C](#))
 2247/04 . . Regenerating the washing fluid ([recovering paint spray booth B05B 15/1266](#))
 2247/06 . . Separation units provided with means for cleaning and maintenance
 2247/08 . . Means for controlling the separation process
 2247/10 . . Means for removing the washing fluid dispersed in the gas or vapours ([separating dispersed particles from gases by gravity, inertia or centrifugal forces B01D 45/00](#))
 2247/101 . . using a cyclone
 2247/102 . . using electrostatic or magnetic effects
 2247/103 . . using fluids, e.g. as a fluid curtain or as large liquid droplets
 2247/104 . . using an impeller
 2247/105 . . by gas flow reversal
 2247/106 . . using an structured demister, e.g. tortuous channels
 2247/107 . . using an unstructured demister, e.g. a wire mesh demister
 2247/108 . . using vortex inducers
 2247/12 . . Fan arrangements for providing forced draft
 2247/14 . . Fan arrangements for providing induced draft

2251/00 Reactants

2251/10 . . Oxidants
 2251/102 . . Oxygen
 2251/104 . . Ozone
 2251/106 . . Peroxides
 2251/1065 . . . Organic peroxides
 2251/108 . . Halogens or halogen compounds ([hydrogen halides B01D 2251/50](#))

2251/11 . . Air
 2251/20 . . Reductants
 2251/202 . . Hydrogen
 2251/204 . . Carbon monoxide
 2251/206 . . Ammonium compounds
 2251/2062 . . . Ammonia
 2251/2065 . . . Ammonium hydroxide
 2251/2067 . . . Urea
 2251/208 . . Hydrocarbons
 2251/21 . . Organic compounds not provided for in groups [B01D 2251/206](#) or [B01D 2251/208](#)

2251/30 . . Alkali metal compounds
 2251/302 . . of lithium
 2251/304 . . of sodium
 2251/306 . . of potassium
 2251/40 . . Alkaline earth metal or magnesium compounds
 2251/402 . . of magnesium
 2251/404 . . of calcium
 2251/406 . . of strontium
 2251/408 . . of barium
 2251/50 . . Inorganic acids
 2251/502 . . Hydrochloric acid
 2251/504 . . Nitric acid
 2251/506 . . Sulfuric acid
 2251/508 . . Sulfur dioxide
 2251/51 . . Hydrogen sulfide
 2251/512 . . Phosphoric acid
 2251/60 . . Inorganic bases or salts
 2251/602 . . Oxides
 2251/604 . . Hydroxides
 2251/606 . . Carbonates
 2251/608 . . Sulfates
 2251/61 . . Phosphates
 2251/70 . . Organic acids
 2251/80 . . Organic bases or salts
 2251/90 . . Chelants
 2251/902 . . EDTA
 2251/904 . . NTA
 2251/95 . . Specific microorganisms

2252/00 Absorbents, i.e. solvents and liquid materials for gas absorption

2252/10 . . Inorganic absorbents ([chemical reactants B01D 2251/00](#))
 2252/102 . . Ammonia
 2252/103 . . Water
 2252/1035 . . . Sea water
 2252/20 . . Organic absorbents
 2252/202 . . Alcohols or their derivatives
 2252/2021 . . . Methanol
 2252/2023 . . . Glycols, diols or their derivatives
 2252/2025 Ethers or esters of alkylene glycols, e.g. ethylene or propylene carbonate
 2252/2026 Polyethylene glycol, ethers or esters thereof, e.g. Selexol
 2252/2028 Polypropylene glycol, ethers or esters thereof
 2252/204 . . Amines
 2252/20405 . . . Monoamines
 2252/2041 . . . Diamines
 2252/20415 . . . Tri- or polyamines
 2252/20421 . . . Primary amines
 2252/20426 . . . Secondary amines

2252/20431	. . . Tertiary amines	2253/3425	. . . . Honeycomb shape
2252/20436	. . . Cyclic amines	2255/00	Catalysts
2252/20442	. . . . containing a piperidine-ring	2255/10	. Noble metals or compounds thereof
2252/20447	. . . . containing a piperazine-ring	2255/102	. . Platinum group metals
2252/20452	. . . . containing a morpholine-ring	2255/1021	. . . Platinum
2252/20457	. . . . containing a pyridine-ring	2255/1023	. . . Palladium
2252/20463	. . . . containing a pyrimidine-ring	2255/1025	. . . Rhodium
2252/20468	. . . . containing a pyrrolidone-ring	2255/1026	. . . Ruthenium
2252/20473	. . . . containing an imidazole-ring	2255/1028	. . . Iridium
2252/20478	. . . Alkanolamines	2255/104	. . Silver
2252/20484	. . . . with one hydroxyl group	2255/106	. . Gold
2252/20489	. . . . with two or more hydroxyl groups	2255/20	. Metals or compounds thereof (noble metals B01D 2255/10)
2252/20494	. . . Amino acids, their salts or derivatives	2255/202	. . Alkali metals
2252/205	. . Other organic compounds not covered by B01D 2252/00 - B01D 2252/20494	2255/2022	. . . Potassium
2252/2053	. . . Other nitrogen compounds	2255/2025	. . . Lithium
2252/2056	. . . Sulfur compounds, e.g. Sulfolane, thiols	2255/2027	. . . Sodium
2252/30	. Ionic liquids and zwitter-ions	2255/204	. . Alkaline earth metals
2252/40	. Absorbents explicitly excluding the presence of water	2255/2042	. . . Barium
2252/50	. Combinations of absorbents	2255/2045	. . . Calcium
2252/502	. . having two or more functionalities in the same molecule other than alkanolamine	2255/2047	. . . Magnesium
2252/504	. . Mixtures of two or more absorbents	2255/206	. . Rare earth metals
2252/60	. Additives	2255/2061	. . . Yttrium
2252/602	. . Activators, promoting agents, catalytic agents or enzymes	2255/2063	. . . Lanthanum
2252/604	. . Stabilisers or agents inhibiting degradation	2255/2065	. . . Cerium
2252/606	. . Anticorrosion agents	2255/2066	. . . Praseodymium
2252/608	. . Antifoaming agents	2255/2068	. . . Neodymium
2252/61	. . Antifouling agents	2255/207	. . Transition metals
2253/00	Adsorbents used in separation treatment of gases and vapours	2255/20707	. . . Titanium
2253/10	. Inorganic adsorbents	2255/20715	. . . Zirconium
2253/102	. . Carbon	2255/20723	. . . Vanadium
2253/104	. . Alumina	2255/2073	. . . Manganese
2253/106	. . Silica or silicates	2255/20738	. . . Iron
2253/108	. . . Zeolites	2255/20746	. . . Cobalt
2253/1085	. . . . characterized by a silicon-aluminium ratio	2255/20753	. . . Nickel
2253/11	. . . Clays	2255/20761	. . . Copper
2253/112	. . Metals or metal compounds not provided for in B01D 2253/104 or B01D 2253/106	2255/20769	. . . Molybdenum
2253/1122	. . . Metals	2255/20776	. . . Tungsten
2253/1124	. . . Metal oxides	2255/20784	. . . Chromium
2253/1126	. . . Metal hydrides	2255/20792	. . . Zinc
2253/1128	. . . Metal sulfides	2255/209	. . Other metals
2253/116	. . Molecular sieves other than zeolites	2255/2092	. . . Aluminium
2253/20	. Organic adsorbents	2255/2094	. . . Tin
2253/202	. . Polymeric adsorbents	2255/2096	. . . Bismuth
2253/204	. . Metal organic frameworks (MOF's)	2255/2098	. . . Antimony
2253/206	. . Ion exchange resins	2255/30	. Silica
2253/25	. Coated, impregnated or composite adsorbents	2255/40	. Mixed oxides
2253/30	. Physical properties of adsorbents	2255/402	. . Perovskites
2253/302	. . Dimensions	2255/405	. . Spinel
2253/304	. . . Linear dimensions, e.g. particle shape, diameter	2255/407	. . Zr-Ce mixed oxides
2253/306	. . . Surface area, e.g. BET-specific surface	2255/50	. Zeolites
2253/308	. . . Pore size	2255/502	. . Beta zeolites
2253/31	. . . Pore size distribution	2255/504	. . ZSM 5 zeolites
2253/311	. . . Porosity, e.g. pore volume	2255/65	. Catalysts not containing noble metals
2253/34	. . Specific shapes	2255/70	. Non-metallic catalysts, additives or dopants
2253/342	. . . Monoliths	2255/702	. . Carbon
		2255/705	. . Ligands for metal-organic catalysts
		2255/707	. . Additives or dopants
		2255/80	. Type of catalytic reaction
		2255/802	. . Photocatalytic
		2255/804	. . Enzymatic

2255/806	. . Electrocatalytic	2257/2066	. . . Fluorine
2255/808	. . Hydrolytic	2257/2068	. . . Iodine
2255/90	. Physical characteristics of catalysts	2257/30	. Sulfur compounds
2255/902	. . Multilayered catalyst	2257/302	. . Sulfur oxides
2255/9022	. . . Two layers	2257/304	. . Hydrogen sulfide
2255/9025	. . . Three layers	2257/306	. . Organic sulfur compounds, e.g. mercaptans
2255/9027	. . . More than three layers	2257/308	. . Carbonylsulfide COS
2255/903	. . Multi-zoned catalysts	2257/40	. Nitrogen compounds
2255/9032	. . . Two zones	2257/402	. . Dinitrogen oxide
2255/9035	. . . Three zones	2257/404	. . Nitrogen oxides other than dinitrogen oxide
2255/9037	. . . More than three zones	2257/406	. . Ammonia
2255/904	. . Multiple catalysts	2257/408	. . Cyanides, e.g. hydrogen cyanide (HCH)
2255/9045	. . . in parallel	2257/50	. Carbon oxides
2255/905	. . Catalysts having a gradually changing coating	2257/502	. . Carbon monoxide
2255/906	. . Catalyst dispersed in the gas	2257/504	. . Carbon dioxide
2255/908	. . O ₂ -storage component incorporated in the catalyst	2257/55	. Compounds of silicon, phosphorus, germanium or arsenic
2255/909	. . H ₂ -storage component incorporated in the catalyst	2257/553	. . Compounds comprising hydrogen, e.g. silanes
2255/91	. . NO _x -storage component incorporated in the catalyst	2257/556	. . Organic compounds
2255/911	. . NH ₃ -storage component incorporated in the catalyst	2257/60	. Heavy metals or heavy metal compounds
2255/912	. . HC-storage component incorporated in the catalyst	2257/602	. . Mercury or mercury compounds
2255/915	. . Catalyst supported on particulate filters	2257/70	. Organic compounds not provided for in groups B01D 2257/00 - B01D 2257/602
2255/9155	. . . Wall flow filters	2257/702	. . Hydrocarbons
2255/92	. . Dimensions	2257/7022	. . . Aliphatic hydrocarbons
2255/9202	. . . Linear dimensions	2257/7025	. . . . Methane
2255/9205	. . . Porosity	2257/7027	. . . Aromatic hydrocarbons
2255/9207	. . . Specific surface	2257/704	. . Solvents not covered by groups B01D 2257/702 - B01D 2257/7027
2256/00	Main component in the product gas stream after treatment	2257/706	. . Organometallic compounds
2256/10	. Nitrogen	2257/708	. . Volatile organic compounds V.O.C.'s
2256/12	. Oxygen	2257/80	. Water
2256/14	. Ozone	2257/90	. Odorous compounds not provided for in groups B01D 2257/00 - B01D 2257/708
2256/16	. Hydrogen	2257/91	. Bacteria; Micro-organisms
2256/18	. Noble gases	2257/93	. Toxic compounds not provided for in groups B01D 2257/00 - B01D 2257/708
2256/20	. Carbon monoxide	2258/00	Sources of waste gases
2256/22	. Carbon dioxide	2258/01	. Engine exhaust gases
2256/24	. Hydrocarbons	2258/012	. . Diesel engines and lean burn gasoline engines
2256/245	. . Methane	2258/014	. . Stoichiometric gasoline engines
2256/26	. Halogens or halogen compounds	2258/016	. . Methanol engines
2257/00	Components to be removed	2258/018	. . Natural gas engines
2257/10	. Single element gases other than halogens	2258/02	. Other waste gases
2257/102	. . Nitrogen	2258/0208	. . from fuel cells
2257/104	. . Oxygen	2258/0216	. . from CVD treatment or semi-conductor manufacturing
2257/106	. . Ozone	2258/0225	. . from chemical or biological warfare
2257/108	. . Hydrogen	2258/0233	. . from cement factories
2257/11	. . Noble gases	2258/0241	. . from glass manufacture plants
2257/20	. Halogens or halogen compounds	2258/025	. . from metallurgy plants
2257/202	. . Single element halogens	2258/0258	. . from painting equipments or paint drying installations
2257/2022	. . . Bromine	2258/0266	. . from animal farms
2257/2025	. . . Chlorine	2258/0275	. . from food processing plants or kitchens
2257/2027	. . . Fluorine	2258/0283	. . Flue gases
2257/204	. . Inorganic halogen compounds	2258/0291	. . . from waste incineration plants
2257/2042	. . . Hydrobromic acid	2258/05	. Biogas
2257/2045	. . . Hydrochloric acid	2258/06	. Polluted air
2257/2047	. . . Hydrofluoric acid	2259/00	Type of treatment
2257/206	. . Organic halogen compounds	2259/10	. Gas phase, e.g. by using aerosols
2257/2062	. . . Bromine compounds		
2257/2064	. . . Chlorine		

- 2259/12 . . Methods and means for introducing reactants (for catalytic processes [B01D 53/90](#))
- 2259/122 . . Gaseous reactants
- 2259/124 . . Liquid reactants
- 2259/126 . . Semi-solid reactants, e.g. slurries
- 2259/128 . . Solid reactants
- 2259/40 . . Further details for adsorption processes and devices
- 2259/40001 . . Methods relating to additional, e.g. intermediate, treatment of process gas
- 2259/40003 . . Methods relating to valve switching
- 2259/40005 . . . using rotary valves
- 2259/40007 . . Controlling pressure or temperature swing adsorption
- 2259/40009 . . . using sensors or gas analysers
- 2259/40011 . . Methods relating to the process cycle in pressure or temperature swing adsorption
- 2259/40013 . . . Pressurization
- 2259/40015 with two sub-steps
- 2259/40016 with three sub-steps
- 2259/40018 with more than three sub-steps
- 2259/4002 . . . Production
- 2259/40022 with two sub-steps
- 2259/40024 with three sub-steps
- 2259/40026 with more than three sub-steps
- 2259/40028 . . . Depressurization
- 2259/4003 with two sub-steps
- 2259/40032 with three sub-steps
- 2259/40033 with more than three sub-steps
- 2259/40035 . . . Equalization
- 2259/40037 with two sub-steps
- 2259/40039 with three sub-steps
- 2259/40041 with more than three sub-steps
- 2259/40043 . . . Purging
- 2259/40045 with two sub-steps
- 2259/40047 with three sub-steps
- 2259/40049 with more than three sub-steps
- 2259/4005 Nature of purge gas
- 2259/40052 Recycled product or process gas
- 2259/40054 treated before its reuse
- 2259/40056 Gases other than recycled product or process gas
- 2259/40058 . . . Number of sequence steps, including sub-steps, per cycle
- 2259/4006 Less than four
- 2259/40062 Four
- 2259/40064 Five
- 2259/40066 Six
- 2259/40067 Seven
- 2259/40069 Eight
- 2259/40071 Nine
- 2259/40073 Ten
- 2259/40075 More than ten
- 2259/40077 . . . Direction of flow
- 2259/40079 Co-current
- 2259/40081 Counter-current
- 2259/40083 . . . Regeneration of adsorbents in processes other than pressure or temperature swing adsorption
- 2259/40084 . . . by exchanging used adsorbents with fresh adsorbents
- 2259/40086 . . . by using a purge gas ([B01D 2259/4009 takes precedence](#))
- 2259/40088 . . . by heating
- 2259/4009 using hot gas
- 2259/40092 using hot liquid
- 2259/40094 by applying microwaves
- 2259/40096 by using electrical resistance heating
- 2259/40098 with other heating means
- 2259/401 . . using a single bed
- 2259/402 . . using two beds
- 2259/403 . . using three beds
- 2259/404 . . using four beds
- 2259/406 . . using more than four beds
- 2259/4061 . . . using five beds
- 2259/4062 . . . using six beds
- 2259/4063 . . . using seven beds
- 2259/4065 . . . using eight beds
- 2259/4066 . . . using nine beds
- 2259/4067 . . . using ten beds
- 2259/4068 . . . using more than ten beds
- 2259/41 . . using plural beds of the same adsorbent in series
- 2259/414 . . using different types of adsorbents
- 2259/4141 . . . within a single bed
- 2259/4143 arranged as a mixture
- 2259/4145 arranged in series
- 2259/4146 Contiguous multilayered adsorbents
- 2259/4148 Multiple layers positioned apart from each other
- 2259/416 . . involving cryogenic temperature treatment
- 2259/418 . . deleted
- 2259/45 . . Gas separation or purification devices adapted for specific applications
- 2259/4508 . . for cleaning air in buildings
- 2259/4516 . . for fuel vapour recovery systems
- 2259/4525 . . for storage and dispensing systems
- 2259/4533 . . for medical purposes
- 2259/4541 . . for portable use, e.g. gas masks
- 2259/455 . . for transportable use ([portable devices B01D 2259/4541](#))
- 2259/4558 . . . for being employed as mobile cleaners for ambient air, i.e. the earth's atmosphere
- 2259/4566 . . for use in transportation means
- 2259/4575 . . . in aeroplanes or space ships
- 2259/4583 . . for removing chemical, biological and nuclear warfare agents
- 2259/4591 . . Construction elements containing cleaning material, e.g. catalysts
- 2259/65 . . Employing advanced heat integration, e.g. Pinch technology
- 2259/652 . . using side coolers
- 2259/655 . . using heat storage materials
- 2259/657 . . . using latent heat, e.g. with phase change materials
- 2259/80 . . Employing electric, magnetic, electromagnetic or wave energy, or particle radiation
- 2259/802 . . Visible light
- 2259/804 . . UV light
- 2259/806 . . Microwaves
- 2259/808 . . Laser
- 2259/81 . . X-rays
- 2259/812 . . Electrons
- 2259/814 . . Magnetic fields
- 2259/816 . . Sonic or ultrasonic vibration
- 2259/818 . . Employing electrical discharges or the generation of a plasma

2265/00	Casings, housings or mounting for filters specially adapted for separating dispersed particles from gases or vapours		
2265/02	Non-permanent measures for connecting different parts of the filter	2275/201	Conical shape
2265/021	Anti-rotational means	2275/202	Disc-shaped filter elements
2265/022	Bayonet connecting means	2275/203	Shapes flexible in their geometry, e.g. bendable, adjustable to a certain size
2265/023	making use of magnetic forces	2275/204	Special shapes of loose filter materials
2265/024	Mounting aids	2275/205	Rectangular shape
2265/025	making use of ramps or cams	2275/206	Special forms, e.g. adapted to a certain housing
2265/026	with means for avoiding false mounting	2275/207	Triangular shape
2265/027	Quick closing means for, e.g. filter heads, caps, maintenance openings	2275/208	Oval shape
2265/028	Snap, latch or clip connecting means	2275/30	Porosity of filtering material
2265/029	Special screwing connections, threaded sections	2275/302	Means for changing the porosity of a filter element, e.g. adjustment of a slit width, compression of a foam material
2265/04	Permanent measures for connecting different parts of the filter, e.g. welding, glueing or moulding	2275/305	Porosity decreasing in flow direction
2265/05	Special adapters for the connection of filters or parts of filters	2275/307	Porosity increasing in flow direction
2265/06	Details of supporting structures for filtering material, e.g. cores	2275/40	Porous blocks
2267/00	Multiple filter elements specially adapted for separating dispersed particles from gases or vapours	2275/403	Flexible blocks
2267/30	Same type of filters	2275/406	Rigid blocks
2267/40	Different types of filters	2275/50	Stabilised filter material, stabilised by, e.g. structuring, calendering
2267/60	Vertical arrangement	2277/00	Filters specially adapted for separating dispersed particles from gases or vapours characterised by the position of the filter in relation to the gas stream
2267/70	Horizontal arrangement	2277/10	Parallel
2271/00	Sealings for filters specially adapted for separating dispersed particles from gases or vapours	2277/20	Inclined, i.e. forming an angle of between 0° and 90°
2271/02	Gaskets, sealings	2277/30	Transverse, i.e. forming an angle of 90°
2271/022	Axial sealings	2279/00	Filters adapted for separating dispersed particles from gases or vapours specially modified for specific uses
2271/025	Making of sealings	2279/10	for air bags, e.g. inflators therefor
2271/027	Radial sealings	2279/20	for collecting heterogeneous particles separately
2273/00	Operation of filters specially adapted for separating dispersed particles from gases or vapours	2279/30	for treatment of exhaust gases from IC Engines
2273/10	Allowing a continuous bypass of at least part of the flow, e.g. of secondary air, vents	2279/35	for venting arrangements
2273/12	Influencing the filter cake during filtration using filter aids	2279/40	for cleaning of environmental air, e.g. by filters installed on vehicles or on streets
2273/14	Filters which are moved between two or more positions, e.g. by turning, pushing	2279/45	for electronic devices, e.g. computers, hard-discs, mobile phones
2273/16	Means for selecting a filter element of a group of filters for a special purpose other than cleaning a filter	2279/50	for air conditioning (air-conditioning systems comprising filters F24F 3/1603)
2273/18	Testing of filters, filter elements, sealings	2279/51	in clean rooms, e.g. production facilities for electronic devices, laboratories
2273/20	High temperature filtration	2279/55	for cleaning appliances, e.g. suction cleaners (suction cleaners comprising filters A47L 9/10)
2273/22	Making use of microwaves, e.g. for measurements	2279/60	for the intake of internal combustion engines or turbines (intake systems for vehicles comprising filters F02M 35/024)
2273/24	Making use of acoustic waves, e.g. for measurements	2279/65	for the sterilisation of air (disinfection, sterilisation or deodorization of air A61L 9/00)
2273/26	Making use of optical waves, e.g. for measurements	2311/00	Details relating to membrane separation process operations and control
2273/28	Making use of vacuum or underpressure	NOTE	
2273/30	Means for generating a circulation of a fluid in a filtration system, e.g. using a pump or a fan		In groups B01D 2311/02 - B01D 2311/08 , the nature of specific operations carried out can be indexed by a combination of symbols chosen from B01D 2311/10 - B01D 2311/2696
2275/00	Filter media structures for filters specially adapted for separating dispersed particles from gases or vapours		
2275/10	Multiple layers	2311/02	Specific process operations before starting the membrane separation process
2275/105	Wound layers		
2275/20	Shape of filtering material		

2311/04	• Specific process operations in the feed stream; Feed pretreatment	2313/10	• Specific supply elements
2311/06	• Specific process operations in the permeate stream	2313/105	• • Supply manifolds
2311/08	• Specific process operations in the concentrate stream	2313/12	• Specific discharge elements
2311/10	• Temperature control	2313/125	• • Discharge manifolds
2311/103	• • Heating	2313/13	• Specific connectors
2311/106	• • Cooling	2313/14	• Specific spacers
2311/12	• Addition of chemical agents	2313/143	• • on the feed side
2311/13	• Use of sweep gas	2313/146	• • on the permeate side
2311/14	• Pressure control	2313/16	• Specific vents
2311/16	• Flux control	2313/18	• Specific valves
2311/165	• • Cross-flow velocity control	2313/19	• Specific flow restrictors
2311/18	• pH control	2313/20	• Specific housing
2311/20	• Power consumption	2313/21	• Specific headers, end caps
2311/22	• characterised by a specific duration or time	2313/22	• Specific cooling or heating elements
2311/24	• Quality control	2313/23	• Specific membrane protectors, e.g. sleeves or screens
2311/243	• • Electrical conductivity control	2313/24	• Specific pressurizing or depressurizing means
2311/246	• • Concentration control	2313/243	• • Pumps
2311/25	• Recirculation, recycling, e.g. recirculation of concentrate into the feed	2313/246	• • Energy recovery means
2311/26	• Further operations combined with membrane separation precesses	2313/26	• Specific gas distributors or gas intakes
2311/2603	• • Application of an electric field, different from the potential difference across the membrane	2313/28	• Specific concentration chambers
2311/2607	• • Application of a magnetic field	2313/30	• Specific dilution or de-ionizing chambers
2311/2611	• • Irradiation	2313/32	• Intermediate chambers
2311/2615	• • • Application of high-frequency electromagnetic fields or microwave irradiation	2313/34	• Energy carriers
2311/2619	• • • UV-irradiation	2313/345	• • Electrodes
2311/2623	• • Ion-Exchange	2313/36	• Energy sources
2311/2626	• • Absorption or adsorption	2313/365	• • Electrical sources
2311/263	• • Chemical reaction	2313/38	• Heat exchangers
2311/2634	• • • Oxidation	2313/40	• Adsorbents within the flow path
2311/2638	• • • Reduction	2313/42	• Catalysts within the flow path
2311/2642	• • Aggregation, sedimentation, flocculation, precipitation or coagulation	2313/44	• Cartridge types
2311/2646	• • Decantation	2313/46	• Supply, recovery or discharge mechanisms of washing members
2311/2649	• • Filtration	2313/48	• Mechanisms for switching between regular separation operations and washing
2311/2653	• • Degassing	2313/50	• Specific extra reservoirs
2311/2657	• • • Deaeration	2313/54	• Modularity of membrane module elements
2311/2661	• • Addition of gas	2313/56	• Specific mechanisms for loading the membrane in a module
2311/2665	• • • Aeration other than for cleaning purposes	2313/58	• Parts of membrane modules specifically adapted to single use
2311/2669	• • Distillation	2313/90	• Other integrated auxiliary systems
2311/2673	• • Evaporation	2315/00	Details relating to the membrane module operation
2311/2676	• • Centrifugal separation	2315/02	• Rotation or turning
2311/268	• • Water softening	2315/04	• Reciprocation, oscillation or vibration
2311/2684	• • Electrochemical processes	2315/05	• Moving the membrane in one direction, e.g. displacement, translational movement
2311/2688	• • Biological processes	2315/06	• Submerged-type; Immersion type
2311/2692	• • Sterilization	2315/08	• Fully permeating type; Dead-end filtration
2311/2696	• • Catalytic reactions	2315/10	• Cross-flow filtration
2313/00	Details relating to membrane modules or apparatus	2315/12	• Feed-and-bleed systems
2313/02	• Specific tightening or locking mechanisms	2315/14	• Batch-systems
2313/025	• • Specific membrane holders	2315/16	• Diafiltration
2313/04	• Specific sealing means	2315/18	• Time sequence of one or more process steps carried out periodically within one apparatus
2313/06	• External membrane module supporting or fixing means	2315/20	• Operation control schemes defined by a periodically repeated sequence comprising filtration cycles combined with cleaning or gas supply, e.g. aeration
2313/08	• Flow guidance means within the module or the apparatus	2317/00	Membrane module arrangements within a plant or an apparatus (membrane assemblies within one housing B01D 2319/00)
2313/083	• • Bypass routes		
2313/086	• • Meandering flow path over the membrane		

2317/02	. Elements in series	2323/02	. Hydrophilization
2317/022	. . Reject series	2323/04	. Hydrophobization
2317/025	. . Permeate series	2323/06	. Specific viscosities of materials involved
2317/027	. . Christmas tree arrangements	2323/08	. Specific temperatures applied
2317/04	. Elements in parallel	2323/10	. Specific pressure applied
2317/06	. Use of membrane modules of the same kind	2323/12	. Specific ratios of components used
2317/08	. Use of membrane modules of different kinds	2323/14	. Aging features
2319/00	Membrane assemblies within one housing (module or elements arrangements within a plant or an apparatus B01D 2317/00)	2323/16	. Use of swelling agents
2319/02	. Elements in series	2323/18	. Use of pore-control agents
2319/022	. . Reject series	2323/20	. Use of plasticizers
2319/025	. . Permeate series	2323/21	. Use of fillers
2319/027	. . Christmas tree arrangements	2323/22	. Use of non-solvents
2319/04	. Elements in parallel	2323/225	. . Use of supercritical fluids
2319/06	. Use of membranes of different materials or properties within one module	2323/24	. Use of template or surface directing agents [SDA]
2321/00	Details relating to membrane cleaning, regeneration, sterilization or to the prevention of fouling	2323/26	. Spraying processes
2321/02	. Forward flushing	2323/28	. Pore treatments
2321/04	. Backflushing	2323/283	. . Reducing the pores
2321/06	. Use of osmotic pressure, e.g. direct osmosis	2323/286	. . Closing of pores, e.g. for membrane sealing
2321/08	. Use of hot water or water vapor	2323/30	. Cross-linking
2321/10	. Use of feed	2323/32	. Use of chain transfer agents or inhibitors
2321/12	. Use of permeate	2323/34	. Use of radiation
2321/14	. Use of concentrate	2323/345	. . UV-treatment
2321/16	. Use of chemical agents	2323/35	. Use of magnetic or electrical fields
2321/162	. . Use of acids	2323/36	. Introduction of specific chemical groups
2321/164	. . Use of bases	2323/38	. Graft polymerization
2321/166	. . Use of enzymatic agents	2323/385	. . involving radiation
2321/168	. . Use of other chemical agents	2323/39	. Electrospinning
2321/18	. Use of gases	2323/40	. in-situ membrane formation
2321/185	. . Aeration	2323/42	. Details of membrane preparation apparatus
2321/20	. By influencing the flow	2323/44	. Relaxation steps
2321/2008	. . statically	2323/46	. Impregnation
2321/2016	. . . Static mixers; Turbulence generators	2323/48	. Influencing the pH
2321/2025	. . . Tangential inlet	2323/50	. Control of the membrane preparation process
2321/2033	. . dynamically	2325/00	Details relating to properties of membranes
2321/2041	. . . Mixers; Agitators	2325/02	. Details relating to pores or porosity of the membranes
2321/205	. . . Integrated pumps	2325/021	. . Characteristic pore shapes
2321/2058	. . . by vibration of the membrane, e.g. with an actuator	2325/022	. . Asymmetric membranes
2321/2066	. . Pulsated flow	2325/023	. . . Dense layer within the membrane
2321/2075	. . . Ultrasonic treatment	2325/025	. . Finger pores
2321/2083	. . By reversing the flow	2325/026	. . Sponge structure
2321/2091	. . using movable bodies, e.g. foam balls	2325/027	. . Nonporous membranes
2321/22	. Electrical effects	2325/028	. . Microfluidic pore structures
2321/223	. . Polarity reversal	2325/04	. Characteristic thickness
2321/226	. . Interruption of electric currents	2325/06	. Surface irregularities
2321/24	. Magnetic effects	2325/08	. Patterned membranes
2321/26	. By suction	2325/10	. Catalysts being present on the surface of the membrane or in the pores
2321/28	. By soaking or impregnating	2325/12	. Adsorbents being present on the surface of the membranes or in the pores
2321/30	. Mechanical cleaning, e.g. with brushes or scrapers	2325/14	. Membrane materials having negatively charged functional groups
2321/32	. By heating or pyrolysis	2325/16	. Membrane materials having positively charged functional groups
2321/34	. by radiation	2325/18	. Membrane materials having mixed charged functional groups
2321/343	. . By UV radiation	2325/20	. Specific permeability or cut-off range
2321/346	. . By gamma radiation	2325/22	. Thermal or heat-resistance properties
2321/40	. Automatic control of cleaning processes	2325/24	. Mechanical properties, e.g. strength
2323/00	Details relating to membrane preparation	2325/26	. Electrical properties
		2325/28	. Degradation or stability over time

- 2325/30 . Chemical resistance
- 2325/32 . Melting point or glass-transition temperatures
- 2325/34 . Molecular weight or degree of polymerization
- 2325/36 . Hydrophilic membranes
- 2325/38 . Hydrophobic membranes
- 2325/40 . Fibre reinforced membranes
- 2325/42 . Ion-exchange membranes
- 2325/44 . Transmission of light
- 2325/46 . Magnetic properties
- 2325/48 . Antimicrobial properties