

**ECLA****EUROPEAN 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 [B30B9/02](#); treatment of water C02F, e.g. softening by ion-exchange [C02F1/42](#); [N: arrangements of air intake cleaners in gas turbine plants [F02C7/05](#)]; arrangements or mounting of filters in air-conditioning, air-humidification or ventilation [F24F13/28](#)) [C1009]

[N: **WARNING** [C1202]

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

<a href="#">B01D9/09</a>	covered by	<a href="#">B01D9/00</a>
<a href="#">B01D15/04</a>	covered by	<a href="#">B01J39/00</a> to <a href="#">B01J49/02</a>
<a href="#">B01D17/022</a>	covered by	<a href="#">B01D17/02B</a>
<a href="#">B01D17/025</a>	covered by	<a href="#">B01D17/02F</a>
<a href="#">B01D17/028</a>	covered by	<a href="#">B01D17/02F2</a>
<a href="#">B01D17/032</a>	covered by	<a href="#">B01D17/02F4</a>
<a href="#">B01D17/035</a>	covered by	<a href="#">B01D17/02D</a>
<a href="#">B01D17/038</a>	covered by	<a href="#">B01D17/02H</a>
<a href="#">B01D17/05</a>	covered by	<a href="#">B01D17/04J</a>
<a href="#">B01D17/09</a>	covered by	<a href="#">B01D17/00B</a>
<a href="#">B01D17/12</a>	covered by	<a href="#">B01D17/00</a>
<a href="#">B01D25/133</a>	covered by	<a href="#">B01D25/28D2</a>
<a href="#">B01D25/168</a>	covered by	<a href="#">B01D25/28D2</a>
<a href="#">B01D25/21</a>	covered by	<a href="#">B01D25/164</a>
<a href="#">B01D29/075</a>	covered by	<a href="#">B01D29/62</a> , <a href="#">B01D29/76</a>
<a href="#">B01D29/37</a>	covered by	<a href="#">B01D29/33B</a> , <a href="#">B01D29/35B</a>
<a href="#">B01D33/052</a>	covered by	<a href="#">B01D33/64</a>
<a href="#">B01D35/01</a>	covered by	<a href="#">B01D36/00D</a>
<a href="#">B01D61/26</a>	covered by	<a href="#">A61M1/16D2</a>
<a href="#">B01D61/34</a>	covered by	<a href="#">A61M1/16</a>

2. 5. The group [B01D24/00](#) was introduced in March 1989. This group includes subject matter of [B01D23/00](#), [B01D25/06](#), [B01D25/10](#), [B01D29/00A8](#), [B01D33/00A1A16](#) and [B01D33/00A1B30](#).
3. 6. Documents from the backlog of the group [B01D23/00](#), and the subgroups [B01D25/06](#), [B01D25/10](#), [B01D29/00A8](#), [B01D33/00A1A16](#) and [B01D33/00A1B30](#) are in the process of being revised and also systematically transferred to [B01D24/00](#).
4. 7. The groups [B01D29/01](#) to [B01D29/43](#) and [B01D29/50](#) to [B01D29/96H](#) were introduced in March 1989; these subgroups include the subject matter of the subgroups of groups [B01D29/00A](#), 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 [B01D29/00A](#) are in the process of being systematically transferred to the other subgroups of group [B01D29/00](#).
6. 11. The documents from the backlog of the subgroups of group [B01D33/00A](#) are in the process of being systematically transferred to the other subgroups of group [B01D33/00](#).

7. 9. Groups [B01D25/16](#), [B01D25/18](#) and [B01D25/20](#) are no longer used for the classification of new. Patent documents are continuously being reclassified to groups [B01D29/44](#), [B01D29/46](#) and [B01D29/48](#).
8. 10. The groups [B01D25/04](#), [B01D25/08](#), [B01D25/12A](#), [B01D25/12B](#), [B01D25/12H](#), [B01D25/12M](#), [B01D25/14](#), 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 [B01D25/00](#), [B01D29/00](#) and subgroups.

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**Notes**

[C0408]

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 [B01D59/00](#) takes precedence over the other groups of this subclass and over other subclasses in class B01

**B01D1/00**

**Evaporating** (IN: evaporation in general, e.g. of liquids for gas phase reactions [B01B1/00B](#)); removal of incrustation [B08B](#); preparation of starch [C08B30/00](#); sugar industry [C13](#); prevention of incrustation [C23F](#); drying solid materials or objects by

porating liquids therefrom F26) [C0311]

- B01D1/00A . [N: Evaporating devices suitable for floating on water] [N1112]
- B01D1/00B . [N: Heating features] [N9502]
- B01D1/00B2 . . [N: Use of electrical or wave energy ([B01D1/00B4](#) takes precedence)] [N9502]
- B01D1/00B2B . . . [N: Induction heating] [N9502]
- B01D1/00B4 . . [N: Use of radiation] [N9502]
- B01D1/00B4B . . . [N: Solar energy (for treatment of water [C02F1/14](#))] [N9502]
- B01D1/00B6 . . [N: Use of fluids] [N9502]
- B01D1/00B6B . . . [N: in a closed circuit ([B01D3/00D](#) takes precedence)]
- B01D1/00B6D . . . [N: Use of a liquid transfer medium or intermediate fluid, e.g. bain-marie] [N9502]
- B01D1/00B8 . . [N: Use of waste energy from other processes or sources, e.g. combustion gas (for water treatment [C02F1/16](#))] [N9502]
- B01D1/00C . [N: Feeding of liquid into an evaporator] [N1112]
- B01D1/00C1 . . [N: the liquid feed being split up in at least two streams before entering the evaporator] [N1112]
- B01D1/00C2 . . [N: Maintaining the liquid in the evaporator at a constant level] [N1112]
- B01D1/00D . [N: Regulation; Control]
- B01D1/00F . [N: Cascade evaporators]
- B01D1/00H . [N: with forced circulation]
- B01D1/02 . Evaporators with heating coils
- B01D1/04 . Evaporators with horizontal tubes
- B01D1/06 . Evaporators with vertical tubes
- B01D1/06B . . [N: by film evaporating]
- B01D1/08 . . with short tubes ([B01D1/12](#) [N: [B01D1/06B](#)] take precedence)
- B01D1/10 . . with long tubes, e.g. Kestner evaporators ([B01D1/12](#) [N: [B01D1/06B](#)] take precedence)
- B01D1/12 . . and forced circulation
- B01D1/14 . with heated gases or vapours [N: or liquids] in contact with the liquid
- B01D1/16 . by spraying ([B01D1/22](#) takes precedence)
- B01D1/18 . . to obtain dry solids ([B01D1/24](#) takes precedence)
- B01D1/20 . . Sprayers (in general [B05B](#))
- B01D1/22 . by bringing a thin layer of the liquid into contact with a heated surface [N: ([B01D1/06B](#) takes precedence)]
- B01D1/22B . . [N: Composite plate evaporators]

- B01D1/22D . . [N: In rotating vessels; vessels with movable parts]
- B01D1/22D2 . . . [N: containing a rotor]
- B01D1/22D2A . . . . [N: with blades or scrapers]
- B01D1/22D2A2 . . . . . [N: in the form of a screw or with helical blade members]
- B01D1/22D2C . . . . [N: with brushes]
- B01D1/22D4 . . . [N: horizontally placed cylindrical container or drum ([B01D1/22D2](#) takes precedence)]
- B01D1/24 . . to obtain dry solids
  
- B01D1/26 . Multiple-effect evaporating
  
- B01D1/28 . with vapour compression
- B01D1/28B . . [N: Special features relating to the vapour to be compressed]
- B01D1/28B2 . . . [N: The vapour is divided in at least two streams and only a part of the vapour is compressed]
- B01D1/28B2B . . . . [N: At least two streams are compressed]
- B01D1/28B4 . . . [N: The vapour is coming from different sources]
- B01D1/28B4B . . . . [N: At least one source is a compressor]
- B01D1/28B8 . . . [N: Cleaning of the vapour before compression, e.g. demisters, washing of the vapour]
  
- B01D1/28B21 . . . [N: B2+B2B]
- B01D1/28B22 . . . [N: B2+B4]
- B01D1/28B23 . . . [N: B2+B4B]
- B01D1/28B24 . . . [N: B2B+B4]
- B01D1/28B25 . . . [N: B2B+B4B]
- B01D1/28B26 . . . [N: B4+B4B]
- B01D1/28D . . [N: Special features relating to the compressed vapour]
- B01D1/28D2 . . . [N: The compressed vapour is divided in at least two streams]
- B01D1/28D4 . . . [N: The compressed vapour is not directed to the same apparatus from which the vapour was taken off]
  
- B01D1/28D6 . . . [N: In combination with vapour from an other source]
- B01D1/28D6B . . . . [N: At least one of the other sources is a compressor, ejector]
- B01D1/28D9 . . . [N: The compressed vapour is used for heating a reboiler or a heat exchanger outside an evaporator]
  
- B01D1/28D240 . . . [N: D2+D4]
  
- [N: **Note**  
Documents are only classified in [B01D1/28D2](#) when at least one stream is directed to the same apparatus from which the vapour was taken off  
]
  
- B01D1/28D246 . . . [N: D2+D4+D6]
- B01D1/28D247 . . . [N: D2+D4+D6B]
- B01D1/28D260 . . . [N: D2+D6]
- B01D1/28D270 . . . [N: D2+D6B]
- B01D1/28D460 . . . [N: D4+D6]
- B01D1/28D470 . . . [N: D4+D6B]

- B01D1/28F . . [N: Compression specifications (e.g. pressure, temperature, processes)]
- B01D1/28H . . [N: Multiple effect compression ([B01D1/28B4B](#), [B01D1/28B23](#), [B01D1/28B25](#) and [B01D1/28B26](#) take precedence)]
- B01D1/28J . . [N: The compressor is integrated in the evaporation apparatus]
- B01D1/28L . . [N: Compressor features (e.g. constructions, details, cooling, lubrication, driving systems)]
- B01D1/28L2 . . . [N: Driving systems]
- B01D1/28M . . [N: Control, regulation]
- B01D1/30 . Accessories for evaporators; [N: Constructional details thereof] [C9502]
- B01D1/30B . . [N: Demister (vapour-liquid separation)]
  
- B01D3/00**      **Distillation or related exchange processes in which liquids are contacted with gaseous media, e.g. stripping** ([N: evaporation in general, e.g. of liquids for gas phase reactions [B01B1/00B](#)]; gas chromatography [B01D15/08](#); destructive distillation [C10B](#); preparation of alcoholic beverages by distillation [C12G3/12](#)) [C0311]
  
- B01D3/00A . [N: Processes specially adapted for distillation or rectification of fermented solutions] [N0207]
- B01D3/00A2 . . [N: by continuous methods] [N0207]
- B01D3/00A4 . . [N: Rectification of spirit] [N0207]
- B01D3/00A4B . . . [N: by continuous methods] [N0207]
- B01D3/00A4B2 . . . . [N: Combined distillation and rectification] [N0207]
  
- B01D3/00B . [N: by vibration]
  
- B01D3/00D . [N: Energy recuperation; Heat pumps]
  
- B01D3/00F . [N: Liquid distribution]
  
- B01D3/00R . [N: in combination with chemical reactions]
  
- B01D3/02 . in boilers or stills
  
- B01D3/04 . pipe stills
  
- B01D3/06 . Flash distillation
- B01D3/06B . . [N: Multiple-effect flash distillation (more than two traps)]
  
- B01D3/08 . in rotating vessels; Atomisation on rotating discs ([N: [B01D1/22D](#)], [B01D3/10](#) take precedence) [C9502]
- B01D3/08B . . [N: using a rotary evaporator] [N0302]
  
- B01D3/10 . Vacuum distillation ([B01D3/12](#) takes precedence)
- B01D3/10A . . [N: Recirculation of the fluid used as fluid working medium in a vacuum creating device] [N1112]
- B01D3/10B . . [N: by using a barometric column] [N9502]
- B01D3/10C . . [N: with the use of an ejector for creating the vacuum, the ejector being placed between evaporator or distillation devices] [N1112]

- B01D3/10D . . [N: with the use of a pump for creating vacuum and for removing the distillate] [N1112]
- B01D3/10E . . [N: using a vacuum lock for removing the concentrate during distillation] [N1112]
- B01D3/12 . Molecular distillation
- B01D3/14 . Fractional distillation [N: or use of a fractionation or rectification column] [C9502]
- B01D3/14A . . [N: where at least one distillation column contains at least one dividing wall] [N1112]
- B01D3/14B . . [N: by two or more of a fractionation, separation or rectification step] [N9502]
- B01D3/14B1 . . . [N: One step being separation by permeation] [N1112]
- B01D3/14B2 . . . [N: Multiple effect distillation] [N9502]
- B01D3/14B4 . . . [N: in combination with at least one evaporator] [N9502]
- B01D3/16 . . Fractionating columns in which vapour bubbles through liquid ([packing elements B01J19/30](#), [B01J19/32](#))
- B01D3/16B . . . [N: Plates with valves]
- B01D3/16D . . . [N: Heating and/or cooling of plates]
- B01D3/18 . . . with horizontal bubble plates
- B01D3/20 . . . . Bubble caps; Risers for vapour; Discharge pipes for liquid
- B01D3/20B . . . . . [N: Bubble caps] [N0409]
- B01D3/22 . . . with horizontal sieve plates or grids; Construction of sieve plates or grids
- B01D3/22A . . . . [N: Dual-flow sieve trays] [N1112]
- B01D3/24 . . . with sloping plates or elements mounted stepwise
- B01D3/26 . . 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
- B01D3/28 . . . Fractionating columns with surface contact and vertical guides, e.g. film action
- B01D3/30 . . Fractionating columns with movable parts or in which centrifugal movement is caused
- B01D3/32 . . Other features of fractionating columns; [N: Constructional details of fractionating columns not provided for in groups [B01D3/16](#) to [B01D3/30](#)]
- B01D3/32B . . . [N: Reboiler specifications] [N9502]
- B01D3/32D . . . [N: Tray constructions] [N9502]
- B01D3/32D2 . . . . [N: Tray supports] [N9502]
- B01D3/32D4 . . . . [N: Sealing between the column and the trays] [N9502]
- B01D3/34 . with one or more auxiliary substances
- B01D3/34B . . [N: the substance being a gas] [N9502]
- B01D3/34B2 . . . [N: the gas being used for removing vapours, e.g. transport gas] [N9502]
- B01D3/36 . . Azeotropic distillation
- B01D3/38 . . Steam distillation
- B01D3/40 . . Extractive distillation
- B01D3/42 . Regulation; Control
- B01D3/42B . . [N: Reflux ratio control splitter]
- B01D3/42D . . [N: of columns]

B01D3/42D2	. . .	[N: Head stream]
B01D3/42D4	. . .	[N: Head- and side stream]
B01D3/42D6	. . .	[N: Head- and bottom stream]
B01D3/42D8	. . .	[N: Head- and feed stream]
B01D3/42D10	. . .	[N: Head-, side- and bottom stream]
B01D3/42D12	. . .	[N: Head-, side- and feed stream]
B01D3/42D14	. . .	[N: Head-, bottom- and feed stream]
B01D3/42D16	. . .	[N: Head-, side-, bottom- and feed stream]
B01D3/42D18	. . .	[N: Side stream]
B01D3/42D20	. . .	[N: Side- and bottom stream]
B01D3/42D22	. . .	[N: Side- and feed stream]
B01D3/42D24	. . .	[N: Side-, bottom- and feed stream]
B01D3/42D26	. . .	[N: Bottom stream]
B01D3/42D28	. . .	[N: Bottom- and feed stream]
B01D3/42D30	. . .	[N: Feed stream]

**B01D5/00**      **Condensation of vapours; Recovering volatile solvents by condensation** ([B01D8/00](#) takes precedence; condensers [F28B](#))

B01D5/00B	. . .	[N: by using heat-exchange surfaces for indirect contact between gases or vapours and the cooling medium]
B01D5/00B10	. . .	[N: Coils or serpentines]
B01D5/00B12	. . .	[N: Horizontal tubes]
B01D5/00B14	. . .	[N: Vertical tubes]
B01D5/00B16	. . .	[N: Plates]
B01D5/00B18	. . .	[N: Dome shaped ( <a href="#">B01D5/00H10D</a> takes precedence)]
B01D5/00B20	. . .	[N: Vortex]
B01D5/00B22	. . .	[N: Rotating vessels or vessels containing movable parts]
B01D5/00D	. . .	[N: by direct contact between vapours or gases and the cooling medium]
B01D5/00D2	. . .	[N: within column(s)]
B01D5/00F	. . .	[N: Other features]
B01D5/00F10	. . .	[N: Multiple-effect condensation; Fractional condensation]
B01D5/00F12	. . .	[N: Recuperation of heat, e.g. use of heat pump(s), compression]
B01D5/00F14	. . .	[N: Thermo-electric condensing; using Peltier-effect]
B01D5/00F16	. . .	[N: Vacuum condensation]
B01D5/00F18	. . .	[N: Barometric condensation]
B01D5/00F20	. . .	[N: Regulation processes; Control systems e.g. valves]
B01D5/00F22	. . .	[N: General arrangements, e.g. flow sheets]
B01D5/00H	. . .	[N: in combination with other processes]
B01D5/00H10	. . .	[N: with evaporation or distillation]
B01D5/00H10B	. . .	[N: Reflux condensation]

- B01D5/00H10D . . . [N: Dome shaped condensation]
- B01D5/00H12 . . [N: with degasification or deaeration]
- B01D5/00H14 . . [N: with filtration]
- B01D5/00H16 . . [N: with heat exchanging ([B01D5/00F12](#) takes precedence)]
  
- B01D5/00K . . [N: characterised by auxiliary systems or arrangements]
- B01D5/00K10 . . [N: Feeding the steam or the vapours]
- B01D5/00K12 . . [N: Feeding or collecting the cooling medium ([B01D5/00K14](#) takes precedence)]
- B01D5/00K14 . . [N: Recirculating of the cooling medium]
- B01D5/00K16 . . [N: Collecting, removing and/or treatment of the condensate]
- B01D5/00K18 . . [N: Removing and treatment of non condensable gases]
- B01D5/00K20 . . [N: Cleaning (cleaning in general [B08B](#))]
  
- B01D7/00**                    **Sublimation** ([B01D8/00](#) takes precedence; freeze-drying [F26](#))
  
- B01D7/02 .    Crystallisation directly from the vapour phase (into single crystals [C30B23/00](#))
  
- B01D8/00**                    **Cold traps; Cold baffles** (pumps for evacuating by condensing or freezing [F04B37/08](#))
  
- B01D9/00**                    **Crystallisation** (crystallisation directly from the vapour phase [B01D7/02](#); making single crystals [C30B](#); [N: crystallisation as part of the Bayer process also classified in [C01F7/14](#)])
  
- B01D9/00B .    [N: cooling by heat exchange (by evaporation of components of the mixture to be separated [B01D9/00B4](#); refrigeration machines [F25B](#))]
- B01D9/00B2 . . . [N: by direct heat exchange with added cooling fluid]
- B01D9/00B4 . . . [N: by indirect heat exchange]
  
- B01D9/00C .    [N: Evaporation of components of the mixture to be separated]
- B01D9/00C2 . . . [N: by reducing pressure]
- B01D9/00C4 . . . [N: by means of conveying fluid, e.g. spray-crystallisation (spray-drying [F26B](#))]
- B01D9/00C6 . . . [N: by heating ([B01D9/00C2](#), [B01D9/00C4](#) take precedence)]
  
- B01D9/00D .    [N: Crystallisation on to a bed of product crystals; Seeding]
  
- B01D9/00E .    [N: Fractional crystallisation; Fractionating or rectifying columns]
- B01D9/00E2 . . . [N: Washing of crystals, e.g. in wash columns] [N1110]
  
- B01D9/00F .    [N: Selection of auxiliary, e.g. for control of crystallisation nuclei, of crystal growth, of adherence to walls; Arrangements for introduction thereof]
- B01D9/00F2 . . . [N: Use of anti-solvent] [N1110]
  
- B01D9/00G .    [N: General arrangements of crystallisation plant, e.g. flow sheets]
  
- B01D9/00H .    [N: Control or regulation (control per se G05)]
  
- B01D9/00K .    [N: Prevention of crystallisation]

- B01D9/00M . [N: Crystallisation in microfluidic devices] [N1110]
- B01D9/00S . [N: Screening for crystallisation conditions or for crystal forms] [N1110]
- B01D9/00U . [N: Use of vibrations, e.g. ultrasound] [N1110]
- B01D9/02 . from solutions [N: not used] [C1110]
- B01D9/04 . . concentrating solutions by removing frozen solvent therefrom

## B01D11/00 Solvent extraction

- B01D11/02 . of solids
  - [N: **Note**  
Combinations of characteristics of individual groups, e.g. [B01D11/02M4A](#) and [B01D11/02S](#) are expressed as [B01D11/02M4A+/02S](#) ]
- B01D11/02B . . [N: with a supercritical fluid]
- B01D11/02C . . [N: Control systems]
- B01D11/02E . . [N: in combination with an electric or magnetic field]
- B01D11/02M . . [N: Solid material in other stationary receptacles]
- B01D11/02M2 . . . [N: Fixed bed of solid material]
- B01D11/02M4 . . . [N: Moving bed of solid material (see also [B01D11/02P](#))]
- B01D11/02M4A . . . . [N: with the general transport direction of the solids parallel to the rotation axis of the conveyer, e.g. worm]
- B01D11/02M4B . . . . [N: using moving bands, trays fixed on moving transport chains]
- B01D11/02M4C . . . . [N: 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 ([B01D11/02M4F](#) takes precedence)] [C9703]
- B01D11/02M4F . . . . [N: on fixed or rotating flat surfaces, e.g. tables combined with rotating elements or on rotating flat surfaces]
- B01D11/02M4K . . . . [N: in towers, e.g. comprising contacting elements]
- B01D11/02M4K2 . . . . . [N: comprising rotating means] [N9703]
- B01D11/02M4K4 . . . . . [N: comprising jet means] [N9703]
- B01D11/02M6 . . . [N: Fluidised bed of solid materials]
- B01D11/02M6J . . . . [N: using mixing mechanisms, e.g. stirrers, jets ([B01D11/02M4K](#) takes precedence)] [C9703]
- B01D11/02P . . [N: comprising vibrating mechanisms, e.g. mechanical, acoustical]
- B01D11/02P2 . . . [N: Applying ultrasound] [N1110]
- B01D11/02R . . [N: Solid material in other moving receptacles ([B01D11/02M4F](#) takes precedence)]
- B01D11/02R2 . . . [N: in rotating drums]
- B01D11/02R2A . . . . [N: with the general transport direction of the solids parallel to the rotation axis of the conveyer, e.g. spirals]
- B01D11/02S . . [N: Flow sheets]
- B01D11/02S2 . . . [N: Multistage extraction]
- B01D11/02T . . [N: Applications, solvents]

- B01D11/02W . . [N: Treatment of the solvent]
- B01D11/02W4 . . . [N: Condensation of solvent vapours (condensation in general [B01D5/00](#))]
  
- B01D11/04 . of solutions which are liquid
- B01D11/04B . . [N: with a supercritical fluid]
- B01D11/04B2 . . . [N: the supercritical fluid acting as solvent for the solute] [N1110]
- B01D11/04B4 . . . [N: the supercritical fluid acting as solvent for the solvent and as anti-solvent for the solute, e.g. formation of particles from solutions] [N1110]
- B01D11/04C . . [N: in combination with membranes]
- B01D11/04E . . [N: in combination with an electric or magnetic field or with vibrations] [C1110]
- B01D11/04E2 . . . [N: Applying ultrasound] [N1110]
- B01D11/04K . . [N: Counter-current multistage extraction towers in a vertical or sloping position]
- B01D11/04K2 . . . [N: with stationary contacting elements, sieve plates or loose contacting elements]
- B01D11/04K4 . . . [N: comprising rotating mechanisms, e.g. mixers, rotational oscillating motion, mixing pumps]
- B01D11/04K6 . . . [N: comprising vibrating mechanisms, electromagnetic radiations]
- B01D11/04K8 . . . [N: Mixers with gas-agitation]
- B01D11/04M . . [N: Juxtaposition of mixers-settlers]
- B01D11/04M2 . . . [N: with stationary contacting elements]
- B01D11/04M3 . . . [N: with narrow passages limited by plates, walls, e.g. helically coiled tubes ([B01D11/04M5](#) takes precedence)]
- B01D11/04M4 . . . [N: comprising rotating mechanisms, e.g. mixers, mixing pumps]
- B01D11/04M5 . . . [N: mixing by counter-current streams provoked by centrifugal force]
- B01D11/04M6 . . . [N: comprising vibrating mechanisms, radiations]
- B01D11/04M8 . . . [N: with gas agitation]
- B01D11/04M9 . . . [N: Jet mixers, venturi mixers]
- B01D11/04N . . [N: Moving receptacles, e.g. rotating receptacles]
- B01D11/04N2 . . . [N: Mixing by counter-current streams provoked by centrifugal force, in rotating coils or in other rotating spaces]
- B01D11/04R . . [N: Controlling means]
- B01D11/04S . . [N: Flow sheets]
- B01D11/04T . . [N: Applications, solvents used]
- B01D11/04U . . [N: by extraction in microfluidic devices] [N1110]

**B01D12/00**

**Displacing liquid, e.g. from wet solids or from dispersions of liquids or from solids in liquids, by means of another liquid**

[N: **Note**

Attention is drawn to WARNING (6) following the subclass title

]

**B01D15/00**

**Separating processes involving the treatment of liquids with solid sorbents (using liquid sorbents [B01D11/00](#); ion exchange processes or materials, sorbent materials in general B01J, e.g. sorbents for chromatography [B01J20/281](#); for investigating or analysing materials [G01N30/00](#)); Apparatus therefor [C0409]**

- B01D15/02 . with moving adsorbents
- B01D15/08 . Selective adsorption, e.g. chromatography

[N: **WARNING**

[C1205] Groups [B01D15/10-B01D15/24F](#) are used for systematic classification from May 2003 onwards. For documents published before that date, see also this group ]

**Note**

[C0803]

In order that group [B01D15/08](#) 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 [A23C9/148](#), treatment of blood, e.g. [A61M1/36](#), optically active organic compounds [C07B57/00](#) or peptides [C07K1/16](#)

- B01D15/10 . . characterised by constructional or operational features [N0305]
- B01D15/12 . . . relating to the preparation of the feed [N0305]
- B01D15/12A . . . . [N: Pre-filtration] [N1204]
- B01D15/14 . . . relating to the introduction of the feed to the apparatus [N0305]
- B01D15/16 . . . relating to the conditioning of the fluid carrier [N0305]
- B01D15/16B . . . . [N: Temperature conditioning] [N0305]
- B01D15/16P . . . . [N: Pressure or speed conditioning] [N0305]
- B01D15/16P2 . . . . . [N: Flash chromatography] [N1204]
- B01D15/16T . . . . . [N: Fluid composition conditioning, e.g. gradient] [N0305]
- B01D15/16T2 . . . . . [N: pH gradient, chromatofocusing, i.e. separation according to the isoelectric point pI] [N1204]
- B01D15/18 . . . relating to flow patterns [N0305]
- B01D15/18C . . . . [N: using counter-currents, e.g. fluidised beds] [N0305]
- B01D15/18R . . . . [N: recycling of the fraction to be distributed] [N0305]
- B01D15/18R2 . . . . . [N: Simulated moving beds] [N0305]
- B01D15/18R2A . . . . . . [N: characterized by process features] [N1204]
- B01D15/18R2A2 . . . . . . . {7 dots} [N: Flushing] [N1204]
- B01D15/18R2B . . . . . . [N: characterized by apparatus features] [N1204]
- B01D15/18R2C . . . . . . [N: characterized by the components to be separated] [N1204]
- B01D15/18R4 . . . . . [N: Reactive simulated moving beds] [N1204]
- B01D15/18T . . . . . [N: using two or more columns] [N0305]
- B01D15/18T2 . . . . . [N: placed in series] [N1204]
- B01D15/18T2A . . . . . . [N: for multi-dimensional chromatography] [N1204]
- B01D15/18T4 . . . . . [N: placed in parallel] [N1204]
- B01D15/18W . . . . . [N: the sorbent material moving as a whole, e.g. continuous annular chromatography, true moving beds] [N0305]
- B01D15/20 . . . relating to the conditioning of the sorbent material [N0305]
- B01D15/20E . . . . [N: Equilibration or regeneration] [N0305]
- B01D15/20P . . . . [N: Packing or coating] [N0305]
- B01D15/22 . . . relating to the construction of the column [N0305]

B01D15/24	. . .	relating to the treatment of the fractions to be distributed [N0305]
B01D15/24B	. . . .	[N: Intermediate storage of effluents] [N0305]
B01D15/24D	. . . .	[N: Adding materials to the effluents] [N0305]
B01D15/24E	. . . .	[N: Fraction collectors] [N0305]
B01D15/26	. .	characterised by the separation mechanism [N0305]
B01D15/26B	. . .	[N: Adsorption chromatography] [N0305]
B01D15/30	. . .	Partition chromatography [N0305]
B01D15/30A	. . . .	[N: Hydrophilic interaction chromatography (HILIC)] [N1204]
B01D15/32	. . .	Bonded phase chromatography [N0305]
B01D15/32N	. . . .	[N: Normal bonded phase] [N0305]
B01D15/32R	. . . .	[N: Reversed phase] [N0305]
B01D15/32R2	. . . . .	[N: with hydrophobic interaction] [N0305]
B01D15/34	. . .	Size selective separation, e.g. size exclusion chromatography, gel filtration, permeation [N0305]
B01D15/34P	. . . .	[N: Perfusive chromatography] [N0305]
B01D15/36	. . .	involving ionic interaction [N0305]
B01D15/36B	. . . .	[N: Ion-exchange] [N0305]
B01D15/36B2	. . . . .	[N: Cation-exchange] [N0305]
B01D15/36B4	. . . . .	[N: Anion-exchange] [N0305]
B01D15/36B6	. . . . .	[N: Amphoteric or zwitterionic ion-exchanger] [N1204]
B01D15/36E	. . . .	[N: Ion-exclusion] [N0305]
B01D15/36P	. . . .	[N: Ion-pair, e.g. ion-pair reversed phase] [N0305]
B01D15/36S	. . . .	[N: Ion-suppression] [N0305]
B01D15/36U	. . . .	[N: Cation- pi interaction] [N1204]
B01D15/38	. . .	involving specific interaction not covered by one or more of groups <a href="#">B01D15/26B</a> to <a href="#">B01D15/36</a> [N0305]
B01D15/38A	. . . .	[N: Affinity chromatography] [N0305]
B01D15/38A1	. . . . .	[N: of the antigen-antibody type, e.g. protein A, G, L chromatography] [N1204]
B01D15/38A2	. . . . .	[N: of the substrate or co-factor - enzyme type] [N1204]
B01D15/38A3	. . . . .	[N: of the nucleic acid-nucleic acid binding protein type] [N1204]
B01D15/38A4	. . . . .	[N: of other types, e.g. avidin, streptavidin, biotin] [N1204]
B01D15/38A5	. . . . .	[N: Ligand exchange chromatography, e.g. complexation, chelation or metal interaction chromatography] [N1204]
B01D15/38B	. . . .	[N: Chiral chromatography] [N0305]
B01D15/38M	. . . .	[N: Micellar chromatography] [N0305]
B01D15/38N	. . . .	[N: Multimodal interactions] [N1204]
B01D15/38P	. . . .	[N: using imprinted phases or molecular recognition; using imprinted phases] [N0305] [C1205]
B01D15/38R	. . . .	[N: Reaction chromatography] [N1204]
B01D15/38S	. . . .	[N: using an external stimulus] [N1204]
B01D15/38S1	. . . . .	[N: using ultra-sound] [N1204]
B01D15/38S2	. . . . .	[N: using light] [N1204]
B01D15/38S3	. . . . .	[N: modifying the temperature] [N1204]

- B01D15/38S4 . . . . . [N: modifying the pH] [N1204]
- B01D15/38S5 . . . . . [N: Using electrical or magnetic means] [N1204]
- B01D15/40 . . . . . using supercritical fluid as mobile phase or eluent [N0305]
- B01D15/42 . . . . . characterised by the development mode, e.g. by displacement or by elution [N0305]
- B01D15/42D . . . . . [N: Displacement mode] [N0305]
- B01D15/42E . . . . . [N: Elution mode] [N1204]
- B01D15/42E2 . . . . . [N: Specific type of solvent] [N1204]
- B01D15/42F . . . . . [N: Frontal mode] [N0305]

**B01D17/00**

**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 [C02F1/40](#); cleaning or keeping clear the surface of open water from oil or like materials [E02B15/04](#); arrangements for separating lubricants from refrigerants [F25B43/02](#)) [[C0204](#)]

**[N: Note**

in this group, documents are classified and arranged according to a combination system limited to the symbols of the group and subgroups of [B01D17/00](#). In this system each combination is indicated, also of subgroups depending from the same group, e.g. [B01D17/04B+/04D](#)

]

- B01D17/00B . . . [N: by thermal diffusion]
- B01D17/02 . . . Separation of non-miscible liquids
- B01D17/02B . . . [N: by ab- or adsorption]
- B01D17/02D . . . [N: by gas bubbles or moving solids]
- B01D17/02F . . . [N: by sedimentation]
- B01D17/02F2 . . . [N: with baffles]
- B01D17/02F4 . . . [N: with removal of one of the phases]
- B01D17/02H . . . [N: by centrifugal force]
- B01D17/04 . . . Breaking emulsions
- B01D17/04B . . . [N: with moving devices]
- B01D17/04D . . . [N: by changing the temperature]
- B01D17/04F . . . [N: by changing the pressure]
- B01D17/04H . . . [N: with coalescers]
- B01D17/04J . . . [N: with separation aids]
- B01D17/04L . . . [N: by changing the state of aggregation]
- B01D17/06 . . . Separation of liquids from each other by electricity
- B01D17/08 . . . [N: IPC 3] Thickening liquid suspensions by filtration
- B01D17/08B . . . [N: with membranes]
- B01D17/10 . . . [N: IPC 3] with stationary filtering elements
- B01D17/12 . . . Auxiliary equipment particularly adapted for use with liquid-separating apparatus, e.g. control circuits [N1112]

**[N: WARNING**

[N1112]This group is not complete pending reclassification; see also group [B01D17/00](#)

]

**B01D19/00****Degasification of liquids**

- B01D19/00B . [N: with one or more auxiliary substances]
- B01D19/00B2 . . [N: by bubbling steam through the liquid ([B01D19/00P](#), [B01D19/00P2](#) and [B01D19/00P4](#) take precedence)]
- B01D19/00B2B . . . [N: in contact columns containing plates, grids or other filling elements]
- B01D19/00D . [N: by bringing the liquid in a thin layer]
- B01D19/00D2 . . [N: in rotating vessels or in vessels containing movable parts]
- B01D19/00F . [N: by filtration]
- B01D19/00H . [N: Flash degasification (the other groups take precedence)]
- B01D19/00P . [N: modifying the liquid flow ([B01D19/00D](#) takes precedence)]
- B01D19/00P2 . . [N: Atomizing, spraying, trickling]
- B01D19/00P4 . . [N: in rotating vessels, vessels containing movable parts or in which centrifugal movement is caused ([B01D19/00D2](#) takes precedence)]
- B01D19/00P4B . . . [N: the centrifugal movement being caused by a vortex, e.g. using a cyclone, or by a tangential inlet] [N0003]
- B01D19/00R . [N: Regulation, control including valves and floats (for construction and details of valves [F16K](#))]
- B01D19/00S . [N: General arrangements, e.g. flowsheets ([B01D19/00R](#) takes precedence)]
- B01D19/00V . [N: by a method not covered by groups [B01D19/00B](#) to [B01D19/00P](#)] [C0406]
- B01D19/00V2 . . [N: by vibration]
- B01D19/00V4 . . [N: using an electric current]
- B01D19/00V6 . . [N: using a magnetic field (magnetic separation in general [B03C1/00](#))]
- B01D19/00V8 . . [N: by using a vortex, cavitation] [N0406]
- B01D19/02 . Foam dispersion or prevention (during boiling [B01B1/02](#); during fermentation [C12](#))
- B01D19/04 . . by addition of chemical substances

**[N: Notes**

1. Antifoam compositions containing a specific compound as the main substance are only classified in the, for this specific compound, corresponding [B01D19/04D](#) subgroup (e.g. polysiloxanes receive the classification [B01D19/04D2](#)); when the specific compound(s) is (are) not the main substance, then the attributed classification for this compound(s) is a combination of [B01D19/04D](#) + the corresponding [B01D19/04D](#) subgroup(s), (e.g. hydrocarbons containing silica are classified in [B01D19/04D](#) +

[B01D19/04D2](#)).

If the main substance is a mixture containing more than one specific compound, then the attributed classification is a combination of the corresponding [B01D19/04D](#) subgroup of the specific compounds, (e.g. benzene sulfonate and an amide are classified in [B01D19/04D4](#) + [B01D9/04D20B8](#)).

2. In groups [B01D19/04D](#) to [B01D19/04D40](#), in the absence of an indication to the contrary, an invention is classified in the last appropriate place].

]

<a href="#">B01D19/04D</a>	. . .	[N: characterised by the nature of the chemical substance]
<a href="#">B01D19/04D2</a>	. . . .	[N: compounds containing Si-atoms]
<a href="#">B01D19/04D4</a>	. . . .	[N: compounds containing N-atoms]
<a href="#">B01D19/04D6</a>	. . . .	[N: compounds containing P-atoms]
<a href="#">B01D19/04D8</a>	. . . .	[N: compounds containing S-atoms]
<a href="#">B01D19/04D10</a>	. . . .	[N: compounds containing halogen-atoms]
<a href="#">B01D19/04D20</a>	. . . .	[N: containing aromatic rings]
<a href="#">B01D19/04D20B</a>	. . . . .	[N: with substituted groups]
<a href="#">B01D19/04D20B2</a>	. . . . .	[N: which contain Si-atoms]
<a href="#">B01D19/04D20B4</a>	. . . . .	[N: which contain N-atoms]
<a href="#">B01D19/04D20B6</a>	. . . . .	[N: which contain P-atoms]
<a href="#">B01D19/04D20B8</a>	. . . . .	[N: which contain S-atoms]
<a href="#">B01D19/04D20B10</a>	. . . . .	[N: which contain halogen-atoms]
<a href="#">B01D19/04D30</a>	. . . .	[N: containing rings other than aromatic rings]
<a href="#">B01D19/04D30B</a>	. . . . .	[N: with substituted groups]
<a href="#">B01D19/04D30B2</a>	. . . . .	[N: which contain Si-atoms]
<a href="#">B01D19/04D30B4</a>	. . . . .	[N: which contain N-atoms]
<a href="#">B01D19/04D30B6</a>	. . . . .	[N: which contain P-atoms]
<a href="#">B01D19/04D30B8</a>	. . . . .	[N: which contain S-atoms]
<a href="#">B01D19/04D30B10</a>	. . . . .	[N: which contain halogen-atoms]
<a href="#">B01D19/04D40</a>	. . . .	[N: containing hetero rings]

## **B01D21/00**

**Separation of suspended solid particles from liquids by sedimentation** ([N: separation of ores or the like by sedimentation [B03B5/48](#) to [B03B5/60](#)]; differential sedimentation [B03D3/00](#); [N: 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 [C02F1/40](#)) [C9502]

[N: **WARNING**

[N1111]The following groups are not complete: [B01D21/00C](#), see also [B01D21/00](#) [B01D21/00J](#), see also [B01D21/00](#) [B01D21/00N10](#), see also [B01D21/00](#) [B01D21/00N12](#), see also [B01D21/00](#) [B01D21/00M](#), see also [B01D21/00](#) [B01D21/00M4](#), see also [B01D21/00](#) [B01D21/00S](#), see also [B01D21/00](#) [B01D21/24A4](#), see also [B01D21/24A](#) [B01D21/24A4A](#), see also [B01D21/24A](#) [B01D21/24C](#), see also [B01D21/24](#) [B01D21/24D](#), see also [B01D21/24](#) [B01D21/26C](#), see also [B01D21/26](#) [B01D21/26V](#), see also [B01D21/26](#) [B01D21/26Y](#), see also [B01D21/26](#) [B01D21/28](#), see also [B01D21/28](#)

[B01D21/30A](#), see also [B01D21/30](#) [B01D21/30B](#), see also [B01D21/30](#)  
]

- B01D21/00B . [N: Making of sedimentation devices, structural details thereof, e.g. prefabricated parts]
- B01D21/00C . [N: Settling tanks provided with means for cleaning and maintenance] [N1111]
- B01D21/00E . [N: Settling tanks making use of electricity or magnetism ([electric ultra filters B01D31/02](#); [filters making use of electricity or magnetism B01D35/06](#); [magnetic or electrostatic separation B03C](#))]
- B01D21/00F . [N: Settling tanks making use of filters, e.g. by floating layers of particulate material]
- B01D21/00H . [N: Controlling the inclination of settling devices]
- B01D21/00J . [N: provided with a pump mounted in or on a settling tank]
- B01D21/00J2 . . [N: provided with a jet pump] [N1111]
- B01D21/00K . [N: Inlets or outlets provided with regulating devices, e.g. valves, flaps ([B01D21/24 takes precedence](#))]
- B01D21/00L . [N: Floating sedimentation devices]
- B01D21/00M . [N: Sedimentation tanks provided with a plurality of compartments separated by a partition wall ([B01D21/00N takes precedence](#))] [N1111]
- B01D21/00M2 . . [N: Vertical, perforated partition walls ([B01D21/24A4A takes precedence](#))] [N1111]
- B01D21/00M4 . . [N: Horizontal partition walls] [N1111]
- B01D21/00N . [N: Settling tanks provided with contact surfaces, e.g. baffles, particles] [N9502]
- B01D21/00N2 . . [N: Baffles or guide plates] [N1111]
- B01D21/00N4 . . [N: Plurality of essentially parallel plates] [N1111]
- B01D21/00N6 . . [N: Plurality of plates inclined in alternating directions] [N1111]
- B01D21/00N8 . . [N: Plurality of tube like channels] [N1111]
- B01D21/00N10 . . [N: Plates in form of a coil] [N1111]
- B01D21/00N12 . . [N: with counter-current flow direction of liquid and solid particles] [N1111]
- B01D21/00N14 . . [N: with co-current flow direction of liquid and solid particles] [N1111]
- B01D21/00N16 . . [N: with cross-flow flow direction of liquid and solid particles] [N1111]
- B01D21/00N18 . . [N: with a meandering flow pattern of liquid or solid particles] [N1111]
- B01D21/00N20 . . [N: Making of contact surfaces, structural details, materials therefor] [N1111]
- B01D21/00N20C . . . [N: 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] [N1111]
- B01D21/00N20S . . . [N: Contact surfaces having surface features] [N1111]
- B01D21/00Q . [N: Enhancing liquid-particle separation using the flotation principle ([flotation in general B03D1/00](#))] [N1111]

- B01D21/00S . [N: Settling tanks provided with means for ensuring a special flow pattern, e.g. even inflow or outflow ([B01D21/24A2](#) takes precedence)] [N1111]
- B01D21/00T . [N: Heating or cooling mechanisms specially adapted for settling tanks]
- B01D21/00W . [N: Mechanisms for taking out of action one or more units of a multi-unit settling mechanism]
- B01D21/00Y . [N: Safety mechanisms specially adapted for settling tanks ([B01D21/22](#) takes precedence)]
- B01D21/01 . using flocculating agents (for purifying water [C02F1/52](#); for liquid radioactive waste [G21F9/10](#))
- B01D21/02 . Settling tanks [N: with single outlets for the separated liquid] [C9502]
- B01D21/04 . . with moving scrapers
- B01D21/06 . . . with rotating scrapers
- B01D21/08 . . provided with flocculating compartments
- B01D21/10 . [N: IPC 3] Settling tanks with multiple outlets for the separated liquids
- B01D21/12 . . [N: IPC 3] with moving scrapers
- B01D21/14 . . . [N: IPC 3] with rotating scrapers
- B01D21/16 . . [N: IPC 3] provided with flocculating compartments
- B01D21/18 . Construction of the scrapers or the driving mechanisms for settling tanks
- B01D21/18A . . [N: with multiple scraping mechanisms]
- B01D21/18B . . [N: with two or more scrapers fixed at different heights on a central rotating shaft]
- B01D21/20 . . Driving mechanisms
- B01D21/22 . . Safety mechanisms
- B01D21/24 . Feed or discharge mechanisms for settling tanks
- B01D21/24A . . [N: Feed mechanisms for settling tanks]
- B01D21/24A2 . . . [N: having a tangential inlet]
- B01D21/24A4 . . . [N: Liquid distributors with a plurality of feed points] [N1111]
- B01D21/24A4A . . . . [N: Vertically arranged feed points] [N1111]
- B01D21/24C . . [N: The feed or discharge opening located at a distant position from the side walls] [N1111]
- B01D21/24D . . [N: Discharge mechanisms for floating particles]
- B01D21/24D2 . . . [N: provided with scrapers on the liquid surface for removing floating particles] [N1111]
- B01D21/24G . . [N: Discharge mechanisms for the classified liquid]
- B01D21/24N . . [N: Discharge mechanisms for the sediments]
- B01D21/24N2 . . . [N: Conveyer belts]
- B01D21/24N4 . . . [N: Positive-displacement pumps; Screw feeders; Trough conveyers]
- B01D21/24N6 . . . [N: Mammoth pumps, e.g. air lift pumps]
- B01D21/24N7 . . . [N: Means for fluidising the sediments, e.g. by jets or mechanical agitators] [N1111]

- B01D21/24N8 . . . [N: Centrifugal pumps]
- B01D21/24N9 . . . [N: Means or provisions for manually removing the sediments] [N1111]
- B01D21/24R . . [N: bringing about a partial recirculation of the liquid, e.g. for introducing chemical aids]
- B01D21/24V . . [N: provided with means for the removal of gas, e.g. noxious gas, air] [N1111]
  
- B01D21/26 . Separation of sediment aided by centrifugal force [N: or centripetal force] (centrifuges [B04B](#); cyclones [B04C](#))
- B01D21/26C . . [N: by using a centrifuge] [N1111]
- B01D21/26V . . [N: by using a vortex inducer or vortex guide, e.g. coil ([B01D21/00N10](#) takes precedence)] [N1111] [C1204]
- B01D21/26Y . . [N: by using a cyclone] [N1111]
  
- B01D21/28 . Mechanical auxiliary equipment for acceleration of sedimentation, e.g. by vibrators or the like [N1009]
- B01D21/28A . . [N: Settling tanks provided with vibrators] [N1009]
- B01D21/28B . . [N: Means for gentle agitation for enhancing flocculation] [N1111]
  
- B01D21/30 . Control equipment [N1009]  
 [N: **WARNING** [C1204]  
 Groups [B01D21/30A](#) to [B01D21/34](#) are not complete, see also [B01D21/30](#) [N1009]  
 ]
- B01D21/30A . . [N: Active control mechanisms with external energy e.g. with solenoid valve] [N1111]
- B01D21/30C . . [N: Control of chemical properties of a component, e.g. control of pH] [N1009]
- B01D21/30P . . [N: Passive control mechanisms without external energy, e.g. using a float] [N1111]
- B01D21/32 . . Density control of clear liquid or sediment, e.g. optical control; [N: Control of physical properties] [N1009]
- B01D21/34 . . Regulation of feed distribution; Regulation of liquid level; [N: Control of process parameters] [N1009]
  
- Guide heading:** **Filtration; Filtering material, regeneration thereof** ([N: [aquarium filters A01K63/04](#); [filters for cigars and cigarettes A24D3/00](#); [filters for coffee or tea-making machines A47J31/06](#); [filters for frying fat A47J37/12](#); [filters for suction cleaners A47L9/10](#); [blood or infusion liquid filters A61M5/165](#); [N: liquid-liquid separation, e.g. for filtering elements made hydrophilic or hydrophobic, [B01D12/00](#), [B01D17/00](#), [B01D43/00](#); [filtering material and its regeneration, as well as filtering aids, B01D39/00](#); [gas or air filters in general B01D46/00](#); [filtration devices for laboratory use B01L](#); ["dewatering" ore or coal slurry B03B5/48](#); [magnetic filters B03C1/00](#); [screens or sieves per se B07B1/00](#); [N: [filters for lubricating and cooling systems in turning, boring or milling machines B23Q11/10](#); [filters for cooling systems in grinding machines B24B55/00](#); [extrusion filters B29C47/68](#); [N: [filter presses B30B9/02](#); [purification of process water, drinking water and waste water C02F](#); [filters for alcoholic beverages C12H1/00](#); [filtering spinning solution or melt D01D1/10](#); [N: [filters or strainers for papermaking D21D](#); [filters in water collecting systems E03B3/18](#), [E03B7/07](#); [subsoil filters for boreholes E21B43/02](#); [air filters for internal-combustion engines F02M35/02](#); [filters for pumps F04B39/16](#), [F04D29/70](#); [filters in pipe systems F16L55/24](#); [filtration of lubricants F16N39/06](#); [N: [filters for volume measuring apparatus G01F15/12](#)]) [C0204]
  
- B01D23/00** [N: IPC4] **Gravity filters** (with moving filtering elements [B01D33/00A1A18](#)) [C9807]

- B01D23/00B . [N: making filtering elements, not provided for elsewhere (see also [B01D25/00B](#), [B01D27/00B](#), [B01D29/00B](#))]
- B01D23/02 . [N: IPC4] with fixed filter bodies
- B01D23/04 . . [N: IPC4] with filter bags filtering from the inside
- B01D23/06 . . [N: IPC4] with rigid tubular bodies
- B01D23/08 . . [N: IPC4] with saucer-shaped filtering elements
- B01D23/10 . [N: IPC4] with loose filter material
- B01D23/12 . . [N: IPC4] with filtering material supported on louvred sides
- B01D23/14 . . [N: IPC4] carbon filters
- B01D23/16 . . [N: IPC4] Sand or gravel filters [N: (filterbed-basin filters, small bed filters, e.g. in closed housing [B01D23/10](#))]
- B01D23/18 . . [N: IPC4] Bottoms of filter beds
- B01D23/20 . [N: IPC4] Feed or discharge devices (nozzles [B05B](#))
- B01D23/20B . . [N: Special adaptation of spray heads therefor]
- B01D23/24 . [N: IPC4] Regeneration of the filter material in the filter
- B01D23/26 . [N: IPC4] integrally combined with devices for controlling the filtration [N: (shutting-off elements, changing over from one element to another [B01D35/12](#), [B01D35/14](#); control of filtration processes [B01D37/04](#))]
- B01D23/28 . [N: IPC4] Filter funnels; Holders therefor (funnels in general [B67C](#); [N: funnels for laboratory use [B01L](#); coffee or tea strainers or apparatus [A47J31/00](#) - [A47J31/06](#)])
- B01D24/00** **Filters comprising loose filtering material, i.e. filtering material without any binder between the individual particles or fibres thereof ([B01D27/02](#) takes precedence) [C1109]**  
 [N: **Note**  
 See WARNING after subclass title, particularly items (7), (8) and (14)  
 ]
- B01D24/00B . [N: Making filter elements (not provided for elsewhere) (see also [B01D25/00B](#), [B01D27/00B](#), [B01D29/01B](#), [B01D29/11B](#), [B01D33/00B](#))]
- B01D24/00P . [N: with multiple filtering elements in parallel connection]
- B01D24/00P2 . . [N: arranged concentrically or coaxially]
- B01D24/00P4 . . [N: Filters being divided into a plurality of cells or compartments ([B01D24/00P2](#) takes precedence)] [C9605]
- B01D24/00S . [N: with multiple filtering elements in series connection]
- B01D24/00S2 . . [N: arranged concentrically or coaxially]
- B01D24/02 . with the filter bed stationary during the filtration
- B01D24/04 . . the filtering material being clamped between pervious fixed walls ([B01D24/10](#), [B01D24/20](#) take precedence)

- B01D24/04B . . . [N: the filtering material being held in a flexible porous bag] [N9409]
- B01D24/04F . . . [N: with at least one flat vertical wall] [N9604]
- B01D24/04F2 . . . . [N: with vertical tubes distributing the liquid to be filtered or for collecting filtrate] [N9805]
- B01D24/06 . . . the pervious walls comprising a series of louvres or slots
- B01D24/08 . . . the filtering material being supported by at least two pervious coaxial walls
- B01D24/10 . . the filtering material being held in a closed container
- B01D24/10D . . . [N: downward filtration without specifications about the filter material supporting means]
- B01D24/12 . . . Downward filtration, the filtering material being supported by pervious surfaces ([B01D24/18](#) takes precedence)
- B01D24/14 . . . Downward filtration, the container having distribution or collection headers or pervious conduits ([B01D24/18](#) takes precedence)
- B01D24/16 . . . Upward filtration ([B01D24/18](#) takes precedence)
- B01D24/16D . . . . [N: the filtering material being supported by pervious surfaces]
- B01D24/16F . . . . [N: the container having distribution or collection headers or pervious conduits]
- B01D24/18 . . . Combined upward and downward filtration
- B01D24/18D . . . . [N: the filtering material being supported by pervious surfaces]
- B01D24/18F . . . . [N: the container having distribution or collection headers or pervious conduits]
- B01D24/20 . . the filtering material being provided in an open container
- B01D24/20D . . . [N: Downward filtration without specifications about the filter material supporting means]
- B01D24/22 . . . Downward filtration, the filter material being supported by pervious surfaces
- B01D24/24 . . . Downward filtration, the container having distribution or collection headers or pervious conduits
- B01D24/26 . . . Upward filtration
- B01D24/26D . . . . [N: the filtering material being supported by pervious surfaces]
- B01D24/26F . . . . [N: the container having distribution or collection headers or pervious conduits]
- B01D24/28 . . with the filter bed moving during the filtration ([with the filter bed fluidised B01D24/36](#))
- B01D24/30 . . Translation
- B01D24/30P . . . [N: Vibrations]
- B01D24/32 . . Rotation
- B01D24/34 . . with the filtering material and its pervious support moving ([tipping buckets, trays or like sections B01D33/327](#))
- B01D24/36 . . with the filter bed fluidised during the filtration ([with the filter bed being stationary B01D24/02](#))
- B01D24/38 . . Feed or discharge devices
- B01D24/38M . . . [N: using multiple way valves] [N9603]
- B01D24/38R . . . [N: internal recirculation]
- B01D24/40 . . for feeding

- B01D24/40C . . . [N: containing fixed liquid displacement elements or cores]
- B01D24/40S . . . [N: Special treatment of the feed stream before contacting the filtering material, e.g. cutting ([B01D35/24](#), [B01D37/02](#), [B01D37/03](#) take precedence)]
- B01D24/40T . . . [N: provoking a tangential stream]
- B01D24/42 . . for discharging filtrate
- B01D24/42C . . . [N: containing fixed liquid displacement elements or cores]
- B01D24/44 . . for discharging filter cake, e.g. chutes
  
- B01D24/46 . Regenerating the filtering material in the filter ([B01D24/44](#) takes precedence)
- B01D24/46B . . [N: by scrapers, brushes, nozzles or the like placed on the cake-side of the stationary filtering material and only contacting the external layer ([B01D24/46D](#) takes precedence)] [C9807]
- B01D24/46B2 . . . [N: by scrapers]
- B01D24/46B4 . . . [N: by brushes]
- B01D24/46B6 . . . [N: by nozzles acting on the cake side of the filter material, or by fluids acting in co-current direction with the feed stream]
- B01D24/46C . . [N: Construction of spray heads specially adapted for regeneration of the filter material or for filtrate discharging]
- B01D24/46D . . [N: Counter-current flushing, e.g. by air]
- B01D24/46D2 . . . [N: with backwash shoes; with nozzles]
- B01D24/46D4 . . . [N: with valves, e.g. rotating valves]
- B01D24/46D4M . . . . [N: with a rectilinear movement of the closing means] [N9605]
- B01D24/46D6 . . . [N: by using gasbumps]
- B01D24/46D7 . . . [N: by using membranes]
- B01D24/46D8 . . . [N: by using pistons]
- B01D24/46F . . [N: by moving the filtering element ([B01D24/46B](#) and [B01D24/46D](#) take precedence)]
- B01D24/46F2 . . . [N: using rotary devices or vibration mechanisms, e.g. stirrers]
- B01D24/46F4 . . . [N: using free vortex flow]
- B01D24/46F6 . . . [N: using spray devices]
- B01D24/46F8 . . . [N: Displacement of the filtering material to a compartment of the filtering device for regeneration]
- B01D24/46M . . [N: containing filter material retaining means (e.g. screens, balls) placed on the surface of the filter material]
  
- B01D24/48 . integrally combined with devices for controlling the filtration
- B01D24/48B . . [N: Handling the filter cake for purposes other than regenerating]
- B01D24/48B2 . . . [N: for washing]
- B01D24/48B4 . . . [N: for drying]
- B01D24/48B4C . . . . [N: by compression]
- B01D24/48B4G . . . . [N: by gases or by heating]
- B01D24/48B6 . . . [N: Retarding cake deposition on the filter during the filtration period, e.g. using stirrers ([B01D24/40T](#) takes precedence)]
- B01D24/48C . . [N: by clearness or turbidity measuring]
- B01D24/48F . . [N: by flow measuring]
- B01D24/48L . . [N: by level measuring]

- B01D24/48M . . [N: in which the filtering elements are moved between filtering operations; particular measures for removing or replacing the filtering elements ([B01D24/46](#), [B01D24/48B](#) take precedence)]
- B01D24/48P . . [N: by pressure measuring]
- B01D24/48T . . [N: by temperature measuring]
  
- B01D25/00** **Filters formed by clamping together several filtering elements or parts of such elements** ([disc filters B01D29/39](#))
- [N: **Note**[C1109]  
See WARNING after subclass title, particularly items (7), (8), (12), (13) and (14)  
]
- B01D25/00B . [N: Making filtering elements (not provided for elsewhere; see also [B01D24/00B](#), [B01D27/00B](#), [B01D29/01B](#), [B01D29/11B](#), [B01D33/00B](#))]
- B01D25/00C . [N: Clamping devices ([B01D25/12](#) and subgroups take precedence)]
- B01D25/00R . [N: integrally combined with devices for controlling the filtration]
- B01D25/00R1 . . [N: by clearness or turbidity measuring]
- B01D25/00R2 . . [N: by flow measuring]
- B01D25/00R4 . . [N: by level measuring]
- B01D25/00R6 . . [N: by pressure measuring]
- B01D25/00R8 . . [N: by temperature measuring]
- B01D25/02 . in which the elements are pre-formed independent filtering units, e.g. modular systems
- B01D25/04 . [N: IPC4] with screens or sheets, e.g. cloths, paper ([B01D25/12](#) takes precedence)
- B01D25/06 . [N: IPC4] with loose, granular or fibrous filtering material
- B01D25/08 . [N: IPC4] with rigid self-supporting filtering elements
- B01D25/10 . [N: IPC4] in which the suspended particles form the filtering medium
- B01D25/12 . Filter presses, i.e. of the plate and frame type [N: (filter presses in which the liquid is removed by pressing-out solid matter [B30B](#))]
- B01D25/12A . . [N: 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]
- B01D25/12B . . [N: Construction of the plates]
- B01D25/12H . . [N: Pressing-out operation after filtration, e.g. of the cake (presses in general [B30](#))]
- B01D25/12M . . [N: Opening and/or closing and/or pressure applying devices or means]
- B01D25/127 . . 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 ([B01D25/172](#), [B01D25/176](#), [B01D25/19](#) take precedence)
- B01D25/127B . . . [N: the plates or the frames being placed in a non-vertical position]
- B01D25/14 . . [N: IPC4] Clamping means [N: clamping of filter cloth or similar securing means]

- B01D25/16 . [N: IPC3] Edge filtering elements, i.e. using contiguous impervious surfaces
- B01D25/16A . . Chamber-plate presses, i.e. the sides of the filtering elements being clamped between two successive filtering plates ([B01D25/127](#), [B01D25/172](#), [B01D25/176](#), [B01D25/19](#) take precedence)
- B01D25/164B . . . [N: the plates being placed in a non-vertical position]
- B01D25/172 . . Plate spreading means (removal of filter cakes [B01D25/32](#))
- B01D25/176 . . attaching the filter element to the filter press plates, e.g. around the central feed hole in the plates
- B01D25/18 . . [N: IPC3] of flat, stacked bodies
- B01D25/19 . . Clamping means for closing the filter press, e.g. hydraulic jacks
- B01D25/20 . . [N: IPC3] of spirally or helically wound bodies
- B01D25/21 . . Plate and frame presses ([B01D25/172](#), [B01D25/176](#), [B01D25/19](#) take precedence) [C1109]
- B01D25/21B . . . [N: Construction of the filter plates, frames]
- B01D25/22 . Cell-type filters
- B01D25/24 . . Cell-type roll filters
- B01D25/26 . . Cell-type stack filters
- B01D25/28 . Leaching or washing filter cakes in the filter [N: handling the filter cake for purposes other than regenerating]
- B01D25/28B . . [N: specially for chamber filter presses]
- B01D25/28D . . [N: for drying]
- B01D25/28D1 . . . [N: by gases or by heating]
- B01D25/28D2 . . . [N: by compression using inflatable membranes]
- B01D25/28D4 . . . [N: by compression using pistons]
- B01D25/28S . . [N: Retarding cake deposition on the filter during the filtration period, e.g. using stirrers]
- B01D25/30 . Feeding devices; [N: Discharge devices] [C9602]
- B01D25/30B . . [N: specially adapted for chamber filter presses]
- B01D25/30D . . [N: for discharging filtrate] [N9602]
- B01D25/30R . . [N: with internal recirculation through the filtering element ([B01D37/02](#) takes precedence)]
- B01D25/32 . Removal of the filter cakes
- B01D25/32B . . [N: specially for chamber filter presses]
- B01D25/32D . . [N: counter-current flushing, e.g. by air bumps]
- B01D25/32D2 . . . [N: with backwash shoes, with nozzles]
- B01D25/34 . . by moving, [N: e.g. rotating,] the filter elements [N: ([B01D25/172](#), [B01D25/19](#) take precedence)] [C9602]
- B01D25/34M . . . [N: Particular measures for replacing or isolating one or more filtering elements; Transport systems for the filtering apparatus ([B01D25/28](#), [B01D25/32](#), [B01D25/34P](#), [B01D25/36](#) take precedence)]
- B01D25/34P . . . [N: by vibration]
- B01D25/36 . . . by centrifugal force

- B01D25/38 . . by moving parts, e.g. scrapers, contacting stationary filter elements [N: sprayers]
- B01D25/38B . . . [N: Brushes]
- B01D25/38N . . . [N: Nozzles]

#### **B01D27/00 Cartridge filters of the throw-away type**

[N: **Note**[N1109]

See WARNING after subclass title, particularly item (14)  
]

- B01D27/00B . [N: Making filter elements (not provided for elsewhere) (see also [B01D24/00B](#), [B01D25/00B](#), [B01D29/01B](#), [B01D29/11B](#), [B01D33/00B](#))]
- B01D27/02 . with cartridges made from a mass of loose [N: granular or fibrous] material
- B01D27/04 . with cartridges made of a piece of unitary material, e.g. filter paper
- B01D27/06 . . with corrugated, folded or wound material
- B01D27/07 . . . having a coaxial stream through the filtering element
- B01D27/08 . Construction of the casing
- B01D27/10 . Safety devices, e.g. by-passes
- B01D27/10B . . [N: Filter condition indicators]
- B01D27/10D . . [N: Bypass or safety valves]
- B01D27/10F . . [N: Bidirectional working filters]
- B01D27/10H . . [N: Anti-leakage or anti-return valves]
- B01D27/10K . . [N: Flow control valves; Damping or calibrated passages]
- B01D27/14 . having more than one filtering element
- B01D27/14P . . [N: connected in parallel]
- B01D27/14P1 . . . [N: arranged concentrically or coaxially]
- B01D27/14S . . [N: connected in series]
- B01D27/14S1 . . . [N: arranged concentrically or coaxially]

#### **B01D29/00 Other filters with filtering elements stationary during filtration, e.g. pressure or suction filters, or filtering elements therefor [N: ([B01D24/00](#), [B01D25/00](#) and [B01D27/00](#) take precedence)] [C1109]**

[N: **Note**[C1109]

See WARNING after subclass title, particularly items (7), (8), (9), (10), (12) and (14)  
]

- B01D29/00A . [N: Aspects of other filters with filtering elements stationary during filtration, or of filtering elements thereof] [N9602]
- B01D29/00A1 . . [N: Filters with flat filtering elements] [N9602]
- B01D29/00A1B . . . [N: Making filtering elements] [N9602]
- B01D29/00A1C . . . [N: with curved filtering elements] [N9602]
- B01D29/00A1R . . . [N: ring shaped] [N9602]

- B01D29/00A2 . . . [N: 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] [N9602]
- B01D29/00A2B . . . . [N: Filtering bands] [N9602]
- B01D29/00A4 . . . [N: Filters with screens or sheets, e.g. cloth, paper] [N9602]
- B01D29/00A4B . . . . [N: with rigid, self-supporting filtering elements, e.g. of ceramic material] [N9602]
- B01D29/00A4D . . . . [N: Filters with corrugated, folded, or wound sheets] [N9602]
- B01D29/00A4D6 . . . . . [N: allowing a coaxial stream through the filtering element (for cartridge filters [B01D27/06B](#))] [N9602]
- B01D29/00A8 . . . [N: Filters with loose, granular, or fibrous filtering material] [N9602]
- B01D29/00A10 . . . [N: Bag, cage, hose, tube, sleeve, or like filters] [N9602]
- B01D29/00A10H . . . . [N: Pressing-out operation after filtration, e.g. by means of membranes (filter presses [per se B01D25/12](#))] [N9602]
- B01D29/00A10K . . . . [N: Filters having flexible filtering material] [N9602]
- B01D29/00A10K14 . . . . . [N: which is supported] [N9602]
- B01D29/00A10K14B . . . . . . [N: on solid frames with surface grooves and the like] [N9602]
- B01D29/00A10K14D . . . . . . [N: to take up a concertina shape during filtration] [N9602]
- B01D29/00A10L . . . . [N: having rigid self-supporting filtering material ([B01D29/00A34](#) takes precedence)] [N9602] [C9807]
- B01D29/00A10L22 . . . . . [N: Edge filtering elements] [N9602]
- B01D29/00A10M . . . . [N: with multiple filtering units] [N9602]
- B01D29/00A10M2 . . . . . [N: connected in parallel ([B01D29/00A10M6P](#) takes precedence)] [N9602]
- B01D29/00A10M4 . . . . . [N: connected in series ([B01D29/00A10M6S](#) takes precedence)] [N9602]
- B01D29/00A10M6 . . . . . [N: arranged concentrically or coaxially] [N9602]
- B01D29/00A10M6P . . . . . . [N: connected in parallel] [N9602]
- B01D29/00A10M6S . . . . . . [N: connected in series] [N9602]
- B01D29/00A10N . . . . [N: which are vibrated] [N9602]
- B01D29/00A10P . . . . [N: which are open-ended] [N9602]
- B01D29/00A10R . . . . [N: Filter candles] [N9602]
- B01D29/00A34 . . . . [N: Filters with hollow discs side-by-side on or around one or more tubes (with elements moving during filtration [B01D33/00A1B26](#), [B01D33/00A1B28](#))] [N9602] [C9807]
- B01D29/00A34B . . . . . [N: having filtrate discharge tubes fixed non-perpendicularly to the filtering surfaces] [N9602]
- B01D29/00A36 . . . . Filters integrally combined with devices for controlling the filtration (for shutting-off elements or changing over from one element to another [B01D35/12](#), [B01D35/14](#); controlling filtration processes [B01D37/04](#)) [N9602]
- B01D29/00A38 . . . . [N: Regeneration of the filtering material in the filter (for two separate filter elements placed in different units [B01D35/12](#))] [N9602]
- B01D29/00A38B . . . . . [N: by scrapers, brushes, nozzles or the like placed on the cake-side of the filters ([B01D29/00A38F](#) takes precedence)] [N9602] [C9807]
- B01D29/00A38D . . . . . [N: Counter-current flushing, e.g. by air bumps] [N9602]
- B01D29/00A38D2 . . . . . . [N: with backwash shoes; with nozzles] [N9602]
- B01D29/00A38F . . . . . [N: by moving the filter element ([B01D29/00A38K](#) takes precedence)] [N9602]
- B01D29/00A38F2 . . . . . . [N: by vibration] [N9602]

- B01D29/00A38K . . . [N: by centrifugal force] [N9602]
- B01D29/00A42 . . [N: Filters having feed or discharge devices] [N9602]
- B01D29/00B . [N: Making filtering elements (not provided for elsewhere) (see also [B01D23/00B](#), [B01D25/00B](#), [B01D27/00B](#))]
- B01D29/00D . [N: Flat filtering elements ([B01D25/12](#), [B01D25/26](#), [B01D29/00A2B](#), [B01D29/00A34](#) take precedence)] [C9602]
- B01D29/00F . [N: Curved filtering elements, e.g. concave filtering elements]
- B01D29/01 . with flat filtering elements ([B01D29/39](#) takes precedence)
- [N: **Note**  
If the construction of the filtering element itself is of minor importance the document is classified in the subgroups [B01D29/01](#), [B01D19/01C](#), [B01D20/01F](#) or [B01D29/01R](#); otherwise in the subgroups [B01D29/03](#) to [B01D29/07](#) ]
- B01D29/01B . . [N: Making filtering elements (making bag, cage, hose, tube, sleeve or like filtering elements [B01D29/11B](#))]
- B01D29/01C . . [N: with curved filtering elements (construction [B01D29/03D](#), [B01D29/07C](#))]
- B01D29/01F . . [N: with corrugated, folded or wound filtering elements][N9611]
- B01D29/01R . . [N: ring shaped]
- B01D29/03 . . self-supporting
- B01D29/03A . . . [N: with corrugated, folded filtering elements]
- B01D29/03D . . . [N: with curved filtering elements]
- B01D29/03R . . . [N: ring shaped]
- B01D29/03R2 . . . . [N: with corrugated, folded filtering elements]
- B01D29/05 . . supported
- B01D29/05R . . . [N: ring shaped]
- B01D29/07 . . . with corrugated, folded or wound filtering sheets
- B01D29/07C . . . . [N: with curved filtering elements ([B01D29/07R](#), [B01D29/07W](#) take precedence)]
- B01D29/07R . . . . [N: ring shaped]
- B01D29/07W . . . . [N: with wound filtering sheets]
- B01D29/085 . Funnel filters; Holders therefor
- B01D29/09 . with filtering bands, e.g. movable between filtering operations [N: ([B01D25/12A](#) takes precedence)]
- B01D29/09B . . [N: combined with means to fasten the opposite edges of the filtering band together, e.g. Zipper]
- B01D29/09C . . [N: Construction of filtering bands or supporting belts, e.g. devices for centering, mounting or sealing the filtering bands or the supporting belts]
- B01D29/11 . with bag, cage, hose, tube, sleeve or like filtering elements
- [N: **Note**  
If the construction of the filtering element itself is of minor importance the document is

- classified in the subgroups [B01D29/11](#), [B01D29/11D](#) and [B01D29/11G](#), otherwise in the subgroups [B01D29/13](#) to [B01D29/37](#) ]
- B01D29/11B . . [N: Making filtering elements]
  - B01D29/11C . . [N: 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] [N1109] [C1205]
  - B01D29/11D . . [N: arranged for inward flow filtration ([B01D29/15](#), [B01D29/33](#) take precedence)]
  - B01D29/11D2 . . . [N: 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]
  - B01D29/11G . . [N: arranged for outward flow filtration ([B01D29/23](#), [B01D29/35](#) take precedence)]
  - B01D29/11G2 . . . [N: open-ended]
  - B01D29/13 . . Supported filter elements
  - B01D29/15 . . . arranged for inward flow filtration
  - B01D29/17 . . . . open-ended [N: 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]
  - B01D29/19 . . . . on solid frames with surface grooves or the like
  - B01D29/21 . . . . with corrugated, folded or wound sheets [C9602]
  - B01D29/21C . . . . . [N: having a concertina shape]
  - B01D29/21W . . . . . [N: with wound sheets]
  - B01D29/23 . . . arranged for outward flow filtration
  - B01D29/23A . . . . [N: with corrugated, folded or wound sheets]
  - B01D29/23A2 . . . . . [N: having a concertina shape]
  - B01D29/23A4 . . . . . [N: with wound sheets] [N9503]
  - B01D29/25 . . . . open-ended [N: 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]
  - B01D29/27 . . . . Filter bags
  - B01D29/31 . . Self-supporting filtering elements
  - B01D29/33 . . . arranged for inward flow filtration
  - B01D29/33A . . . . [N: with corrugated, folded filtering elements]
  - B01D29/33B . . . . [N: 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]
  - B01D29/35 . . . arranged for outward flow filtration
  - B01D29/35A . . . . [N: with corrugated, folded filtering elements]
  - B01D29/35B . . . . [N: 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]
  - B01D29/39 . with hollow discs side by side on, or around, one or more tubes, e.g. of the leaf type
  - B01D29/39A . . [N: mounted axially on the tube]
  - B01D29/41 . . mounted transversely on the tube

- B01D29/41B . . . [N: divided in sectors]
- B01D29/41T . . . [N: Filtering tables]
- B01D29/43 . . mounted otherwise than transversely on the tube [N: mounted otherwise than axially on the tube]
  
- B01D29/44 . Edge filtering elements, i.e. using contiguous impervious surfaces
- B01D29/44B . . [N: Bar screens]
- B01D29/46 . . of flat, stacked bodies
- B01D29/48 . . of spirally or helically wound bodies
  
- B01D29/50 . with multiple filtering elements, characterised by their mutual disposition ([B01D29/39 takes precedence](#))
- B01D29/52 . . in parallel connexion
- B01D29/54 . . . arranged concentrically or coaxially
- B01D29/56 . . in series connexion
- B01D29/58 . . . arranged concentrically or coaxially
  
- B01D29/60 . integrally combined with devices for controlling the filtration
- B01D29/60C . . [N: by clearness or turbidity measuring]
- B01D29/60F . . [N: by flow measuring]
- B01D29/60L . . [N: by level measuring]
- B01D29/60P . . [N: by pressure measuring]
- B01D29/60T . . [N: by temperature measuring]
  
- B01D29/62 . 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, [B01D35/12](#))
- B01D29/64 . . by scrapers, brushes, [N: nozzles], or the like, acting on the cake side of the filtering element
- B01D29/64B . . . [N: brushes]
- B01D29/64B1 . . . . [N: with a rotary movement with respect to the filtering element]
- B01D29/64B3 . . . . [N: with a translational movement with respect to the filtering element]
- B01D29/64B5 . . . . [N: with a combination of movements with respect to the filtering elements]
- B01D29/64N . . . [N: nozzles]
- B01D29/64N1 . . . . [N: with a rotary movement with respect to the filtering element]
- B01D29/64N3 . . . . [N: with a translational movement with respect to the filtering element]
- B01D29/64N5 . . . . [N: with a combination of movements with respect to the filtering elements]
- B01D29/64S . . . [N: scrapers]
- B01D29/64S1 . . . . [N: with a rotary movement with respect to the filtering element]
- B01D29/64S3 . . . . [N: with a translatory movement with respect to the filtering element]
- B01D29/64S5 . . . . [N: with a combination of movements with respect to the filtering elements]
- B01D29/66 . . by flushing, e.g. counter-current air-bumps
- B01D29/66B . . . [N: by using gas-bumps]
- B01D29/66M . . . [N: by using membranes]
- B01D29/66P . . . [N: by using pistons]
- B01D29/66R . . . [N: by a stirrer placed on the filtrate side of the filtering element]

- B01D29/66V . . . [N: with valves, e.g. rotating valves for coaxially placed filtering elements]
- [N: **Note**  
the subgroup covers only counter-current flushing  
]
- B01D29/68 . . . with backwash arms, shoes or nozzles
- B01D29/68A . . . . [N: with a rotary movement with respect to the filtering element]
- B01D29/68B . . . . [N: with a translatory movement with respect to the filtering element]
- B01D29/68C . . . . [N: with a combination of movements with respect to the filtering elements]
- B01D29/68H . . . . [N: with backwash arms or shoes acting on the cake side]
- B01D29/70 . . . by forces created by movement of the filter element
- B01D29/70C . . . . [N: by compression of compressible filter medium, e.g foam] [N1204]
- B01D29/72 . . . involving vibrations
- B01D29/74 . . . involving centrifugal force
- B01D29/76 . . . Handling the filter cake in the filter for purposes other than for regenerating  
([B01D29/94](#) takes precedence)
- B01D29/78 . . . for washing
- B01D29/80 . . . for drying
- B01D29/82 . . . . by compression
- B01D29/82M . . . . . [N: using membranes]
- B01D29/82P . . . . . [N: using pistons]
- B01D29/82R . . . . . [N: using rollers] [N0002]
- B01D29/82S . . . . . [N: using screws ([B01D29/64S1](#) takes precedence)]
- B01D29/84 . . . . by gases or by heating
- B01D29/84D . . . . . [N: by direct contact with a fluid]
- B01D29/84H . . . . . [N: by indirect heat-exchange]
- B01D29/86 . . . Retarding cake deposition on the filter during the filtration period, e.g. using stirrers  
[N: ([B01D29/90T](#) takes precedence)]
- B01D29/86P . . . . [N: by vibration of the liquid]
- B01D29/88 . . . having feed or discharge devices
- B01D29/88R . . . . [N: with internal recirculation through the filtering element ([B01D37/02](#) takes  
precedence)]
- B01D29/90 . . . for feeding
- B01D29/90C . . . . [N: containing fixed liquid displacement elements or cores]
- B01D29/90D . . . . [N: directing the mixture to be filtered on the filtering element in a manner to  
clean the filter continuously ([B01D29/11D2](#), [B01D29/11G2](#), [B01D29/17](#),  
[B01D29/25](#), [B01D29/33B](#), [B01D29/35B](#), [B01D29/90C](#), [B01D29/90T](#) take  
precedence)]
- B01D29/90S . . . . [N: Special treatment of the feed stream before contacting the filtering element,  
e.g. cutting ([B01D35/24](#), [B01D37/02](#), [B01D37/03](#) take precedence)]
- B01D29/90T . . . . [N: provoking a tangential stream]
- B01D29/92 . . . for discharging filtrate
- B01D29/92C . . . . [N: containing liquid displacement elements or cores]
- B01D29/94 . . . for discharging the filter cake, e.g. chutes

- B01D29/94C . . . [N: for continuously discharging concentrated liquid]
  - B01D29/96 . . in which the filtering elements are moved between filtering operations; Particular measures for removing or replacing the filtering elements; Transport systems for filters ([B01D29/09](#), [B01D29/70](#) take precedence)
  - B01D29/96H . . [N: Device for changing the inclination of the filtering element]
- B01D33/00** **Filters with filtering elements which move during the filtering operation** (filters comprising loose filtering material moving or fluidised during filtration [B01D24/28](#) to [B01D24/36](#); centrifuges B04B) [C1109]
- [N: **Note**[C1109]  
See WARNING after subclass title, particularly items (7), (8), (11) and (14)  
]
- B01D33/00A . . [N: Aspects of filters with filtering elements which move during the filtering operation] [N9702]
  - B01D33/00A1 . . [N: with rotating filtering surfaces (**rotating brush filters** [B01D35/10](#))] [N9702]
  - B01D33/00A1A . . . [N: with cylindrical filtering surfaces, e.g. hollow drums, rotating drum filters for paper making [D21B](#)] [N9702]
  - B01D33/00A1A8 . . . . [N: Drums provided with cells each independently connected with pressure distributor] [N9702]
  - B01D33/00A1A10 . . . . [N: Drums with a single compartment] [N9702]
  - B01D33/00A1A10B . . . . . [N: arranged for outward flow filtration] [N9702]
  - B01D33/00A1A12 . . . . [N: combined with filtering bands or the like] [N9702]
  - B01D33/00A1A12A . . . . . [N: with endless filtering bands] [N9702]
  - B01D33/00A1A12A14 . . . . . [N: with multiple filtering bands with or without one or more non filtering bands] [N9702]
  - B01D33/00A1A16 . . . . [N: with loose, granular, or fibrous filtering material] [N9702]
  - B01D33/00A1A18 . . . . [N: Gravity filters] [N9702]
  - B01D33/00A1A18A . . . . . [N: with external feed] [N9702]
  - B01D33/00A1B . . . [N: with plane surfaces] [N9702]
  - B01D33/00A1B24 . . . . [N: with rotary tables] [N9702]
  - B01D33/00A1B26 . . . . [N: with hollow discs transversely mounted on a hollow shaft] [N9702]
  - B01D33/00A1B28 . . . . [N: with hollow frames axially mounted on a hollow shaft] [N9702]
  - B01D33/00A1B30 . . . . [N: with loose, granular, or fibrous filtering material] [N9702]
  - B01D33/00A1C . . . [N: with filtering surfaces travelling along conveyers (**tipping bucket type** [B01D35/08](#); **brush filters** [B01D35/10](#))] [N9702]
  - B01D33/00A2 . . [N: Accessories and components] [N9702]
  - B01D33/00A2A . . . [N: Devices for handling the filter cake, e.g. washing, discharging] [N9702]
  - B01D33/00A2A2 . . . . [N: with scrapers, brushes, nozzles or the like placed on the cake-side of the filter ([B01D33/00A2A4B](#) takes precedence)] [N9702]
  - B01D33/00A2A4 . . . . [N: counter-current flushing] [N9702]
  - B01D33/00A2A4B . . . . . [N: with backwash shoes, with nozzles] [N9702]
  - B01D33/00A2A6 . . . . [N: by moving the filter element] [N9702]
  - B01D33/00A2A6B . . . . . [N: by vibration] [N9702]
  - B01D33/00A2A6D . . . . . [N: by centrifugal force] [N9702]

- B01D33/00A2B . . . [N: Feed or discharge devices for liquids] [N9702]
- B01D33/00A2C . . . [N: Pressure distribution systems (pressure distribution systems for filters with tipping buckets or trays [B01D35/08](#))] [N9702]
- B01D33/00B . [N: Making filter elements (not provided for elsewhere) (see also [B01D24/00B](#), [B01D25/00B](#), [B01D27/00B](#), [B01D29/01B](#), [B01D29/11B](#))]
- B01D33/00B2 . . [N: moving rectilinearly (filters 35/10)]
- B01D33/01 . with translationally moving filtering elements, e.g. pistons ([B01D33/04](#) to [B01D33/327](#) take precedence)
- B01D33/01C . . [N: with bag, cage, hose, tube, sleeve or the like filtering elements]
- B01D33/01C2 . . . [N: arranged for inward flow filtration]
- B01D33/01C2D . . . . [N: open ended]
- B01D33/01C4 . . . [N: arranged for outward flow filtration]
- B01D33/01C4D . . . . [N: open ended]
- B01D33/01F . . [N: with flat filtering elements]
- B01D33/01F3 . . . [N: self-supporting]
- B01D33/01F3B . . . . [N: Bar screens]
- B01D33/01F3D . . . . [N: with curved filtering elements]
- B01D33/01F5 . . . [N: supported]
- B01D33/01F5C . . . . [N: with corrugated, folded or wound filtering sheets]
- B01D33/03 . . with vibrating filter elements
- B01D33/03C . . . [N: with bag, cage, hose, tube, sleeve or the like filtering elements]
- B01D33/03C2 . . . . [N: arranged for inward flow filtration]
- B01D33/03C2D . . . . . [N: open ended]
- B01D33/03C4 . . . . [N: arranged for outward flow filtration]
- B01D33/03C4D . . . . . [N: open ended]
- B01D33/03F . . . [N: with flat filtering elements]
- B01D33/03F3 . . . . [N: self-supporting]
- B01D33/03F3B . . . . . [N: Bar screens]
- B01D33/03F3D . . . . . [N: with curved filtering elements]
- B01D33/03F5 . . . . [N: supported]
- B01D33/03F5C . . . . . [N: with corrugated, folded or wound filtering sheets]
- B01D33/03F5D . . . . . [N: with curved filtering elements]
- B01D33/04 . with filtering bands or the like supported on cylinders which are impervious for filtering
- B01D33/04B . . [N: whereby the filtration and squeezing-out take place between at least two filtering bands] [C9802]
- B01D33/044 . with filtering bands or the like supported on cylinders which are pervious for filtering
- B01D33/048 . . with endless filtering bands
- B01D33/056 . Construction of filtering bands or supporting belts, e.g. devices for centering, mounting or sealing the filtering bands or the supporting belts
- B01D33/056B . . [N: combined with means to fasten the opposite edges of the filtering band together, e.g. Zipper]

- B01D33/06 . with rotary cylindrical filtering surfaces, e.g. hollow drums ([B01D33/044](#) takes precedence; [N: [rotating drums for paper-making D21B](#)])
- B01D33/067 . . Construction of the filtering drums, e.g. mounting or sealing arrangements
- B01D33/073 . . arranged for inward flow filtration [N9509]
- B01D33/09 . . . with surface cells independently connected to pressure distributors
- B01D33/11 . . arranged for outward flow filtration
- B01D33/13 . . . with surface cells independently connected to pressure distributors
- B01D33/15 . with rotary plane filtering surfaces
- B01D33/15C . . [N: [the filtering surface being parallel to the rotation axis](#)] [N9503]
- B01D33/17 . . with rotary filtering tables ([tables divided into separately tiltable buckets, trays or like sections B01D33/327](#))
- B01D33/19 . . . the table surface being divided in successively tilted sectors or cells, e.g. for discharging the filter cake
- B01D33/21 . . with hollow filtering discs transversely mounted on a hollow rotary shaft
- B01D33/21D . . . [N: [the filtering discs being fixed inwardly on a rotating construction](#)] [N9503]
- B01D33/23 . . . Construction of discs or component sectors thereof
- B01D33/25 . . with hollow frames axially mounted on a hollow rotary shaft
- B01D33/27 . with rotary filtering surfaces, which are neither cylindrical nor planar, e.g. helical surfaces
- B01D33/27C . . [N: [using contiguous impervious surfaces](#)]
- B01D33/29 . the movement of the filter elements being a combination of movements ([B01D33/19](#) takes precedence)
- B01D33/31 . . Planetary movement
- B01D33/327 . . Tipping buckets, trays or like sections
- B01D33/333 . with individual filtering elements moving along a closed path ([tipping buckets, trays or like sections B01D33/327](#))
- B01D33/35 . with multiple filtering elements characterised by their mutual disposition ([N: [B01D33/04B](#)], [B01D33/21](#) take precedence) [C9802]
- B01D33/37 . . in parallel connexion
- B01D33/39 . . . concentrically or coaxially
- B01D33/41 . . in series connexion
- B01D33/42 . . . concentrically or coaxially
- B01D33/44 . 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, B01D35/12](#))
- B01D33/46 . . by scrapers, brushes [N: [nozzles](#)] or the like acting on the cake-side of the filtering element [N: ([B01D33/50B](#) takes precedence)]
- B01D33/46B . . . [N: [brushes](#)]
- B01D33/46N . . . [N: [nozzles](#)]
- B01D33/46R . . . [N: [take-off rollers](#)]
- B01D33/46S . . . [N: [scrapers](#)]

- B01D33/46W . . . [N: wires, strands, strings or the like]
- B01D33/48 . . by flushing, e.g. counter-current air-bumps
- [N: **Note**  
the subgroup covers only counter-current flushing  
]
- B01D33/50 . . . with backwash arms, shoes or nozzles
- B01D33/50B . . . . [N: the backwash arms, shoes acting on the cake side]
- B01D33/50R . . . . [N: with a stirrer placed on the filtrate side]
- B01D33/52 . . by forces created by movement of the filter element
- B01D33/54 . . . involving vibrations
- B01D33/56 . . . involving centrifugal force
- B01D33/58 . Handling the filter cake in the filter for purposes other than for regenerating  
([B01D33/76](#) takes precedence) [N: the filter cake remaining on the filtering element]
- B01D33/60 . . for washing
- B01D33/62 . . for drying
- B01D33/64 . . . by compression
- B01D33/64B . . . . [N: by pressure belts]
- B01D33/64D . . . . [N: by pressure plates, membranes]
- B01D33/64R . . . . [N: by pressure rollers]
- B01D33/64S . . . . [N: by screws]
- B01D33/66 . . . by gases or by heating
- B01D33/66D . . . . [N: by direct contact with a fluid]
- B01D33/66H . . . . [N: by indirect heat-exchange]
- B01D33/68 . . Retarding cake deposition on the filter during the filtration period, e.g. using stirrers
- B01D33/70 . having feed or discharge devices ([B01D33/82](#) takes precedence)
- B01D33/70R . . [N: with internal recirculation through the filter]
- B01D33/72 . . for feeding
- B01D33/72C . . . [N: containing fixed liquid displacement elements or cores]
- B01D33/72S . . . [N: Special treatment of the feed stream before contacting the filtering element,  
e.g. cutting ([B01D35/24](#), [B01D37/02](#), [B01D37/03](#) take precedence)]
- B01D33/72T . . . [N: provoking a tangential stream]
- B01D33/74 . . for discharging filtrate
- B01D33/74C . . . [N: containing fixed liquid displacement elements or cores]
- B01D33/74F . . . [N: Construction of suction casings, pans, or the like]
- B01D33/74F2 . . . . [N: moving during the filtration period]
- B01D33/76 . . for discharging the filter cake, e.g. chutes
- B01D33/76C . . . [N: for continuously discharging concentrated liquid]
- B01D33/76S . . . [N: Devices for breaking the filter cake, e.g. cutting]
- B01D33/80 . Accessories
- B01D33/80D . . [N: Driving means, shaft packing systems or the like]
- B01D33/80H . . [N: Device for changing the inclination of the filtering element]

- B01D33/80M . . [N: in which the filtering elements are moved between filtering operations ([B01D33/52](#) takes precedence); Particular measures for removing or replacing the filtering elements; Transport systems for filters]
  - B01D33/80R . . [N: integrally combined with devices for controlling the filtration]
  - B01D33/80R2 . . . [N: by clearness or turbidity measuring]
  - B01D33/80R3 . . . [N: by flow measuring]
  - B01D33/80R4 . . . [N: by level measuring]
  - B01D33/80R5 . . . [N: by pressure measuring]
  - B01D33/80R6 . . . [N: by temperature measuring]
  - B01D33/82 . . Means for pressure distribution
- B01D35/00**      **Other filtering devices; Auxiliary devices for filtration; Filter housing constructions**
- [N: **Note**[N1109]  
See WARNING after subclass title, particularly item (14)  
]
- B01D35/00B . [N: Filters specially adapted for use in internal-combustion engine lubrication or fuel systems, not of special interest for [B01D23/00](#) - [B01D33/00](#) (**internal-combustion engine lubricating systems** [F02M](#); **lubrication in general** [F16N](#))]
  - B01D35/02 . Filters adapted for location in special places, e.g. pipe-lines, pumps, stop-cocks, ([B01D35/05](#) takes precedence; [N: water pipe system filters [E03B3/18](#), [E03B7/07](#); 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 [E03C1/26](#); suction strainers or filters for pumps [F04B53/00F](#), [F04D29/70](#)]) [[C9807](#)]
  - B01D35/02B . . [N: Filler pipe filters]
  - B01D35/027 . . rigidly mounted in or on tanks or reservoirs ([B01D35/04](#) takes precedence)
  - B01D35/027H . . . [N: Filtering elements with a horizontal or inclined rotation or symmetry axis submerged in tanks or reservoirs] [[N0204](#)]
  - B01D35/027T . . . [N: Filtering elements with a vertical rotation or symmetry axis mounted on tanks or reservoirs] [[N0204](#)]
  - B01D35/04 . . Plug, tap, or cock filters [N: filtering elements mounted in or on a faucet]
  - B01D35/04B . . . [N: Reversible faucet filters]
  - B01D35/04C . . . [N: the filtering element being mounted in the faucet plug]
  - B01D35/05 . Floating filters
  - B01D35/06 . Filters making use of electricity or magnetism (ultrafiltration, microfiltration [B01D61/14](#); electro dialysis, electro-osmosis [B01D61/42](#); devices comprising filters and magnetic separators [B03C1/30](#))
  - B01D35/08 . [N: [IPC4](#)] Filters with tipping buckets or trays
  - B01D35/10 . Brush filters [N: Rotary brush filters]
  - B01D35/12 . Devices for taking out of action one or more units of multi- unit filters, e.g. for regeneration
  - B01D35/14 . Safety devices specially adapted for filtration (preventing or minimising fires or explosions [A62C](#)); Devices for indicating clogging (incorporated in a throw-away filter

- [B01D27/10](#))
- B01D35/143 . . Filter condition indicators
  - B01D35/143A . . . [N: with alarm means] [N1109]
  - B01D35/147 . . Bypass or safety valves
  - B01D35/147P . . . [N: Pressure relief valves or pressure control valves] [N1109]
  - B01D35/15 . . Bidirectional working filters
  - B01D35/153 . . Anti-leakage or anti-return valves
  - B01D35/157 . . Flow control valves: Damping or calibrated passages
  - B01D35/157F . . . [N: Flow control valves] [N1109]
  - B01D35/157R . . . [N: Calibrated passages] [N1109]
  
  - B01D35/16 . . Cleaning-out devices [N: e.g. for removing the cake from the filter casing or for evacuating the last remnants of liquid]
  
  - B01D35/18 . . Heating or cooling the filters
  - B01D35/18B . . . [N: comprising a vaporizing unit]
  
  - B01D35/20 . . Vibrating the filters (regenerating filter material by vibrations in filters with stationary filtering elements [B01D29/72](#); discharging the filter cake by vibrations in filters with moving filtering elements [B01D33/54](#), [B01D33/76](#))
  
  - B01D35/22 . . Directing the mixture to be filtered on to the filters in a manner to clean the filters [N: ([B01D29/90D](#) takes precedence)]
  
  - B01D35/24 . . Providing loose granular material to scratch the filters clean
  
  - B01D35/26 . . Filters with built-in pumps [N: filters provided with a pump mounted in or on the casing ([aquarium pumps or filters A01K63/04](#))] [C9807]
  
  - B01D35/28 . . Strainers not provided for elsewhere
  
  - B01D35/30 . . Filter housing constructions
  - B01D35/30B . . . [N: Constructions of two or more housings ([B01D35/12](#) takes precedence)]
  - B01D35/30B2 . . . . [N: the housings being modular, e.g. standardised]
  - B01D35/30C . . . [N: with features related to crash tests or crash safety measures] [N1109]
  - B01D35/30D . . . [N: Filter mounting adapter]
  - B01D35/30M . . . [N: Made of at least two different materials, e.g. metal and plastic] [N1109]
  - B01D35/31 . . . including arrangements for environmental protection, e.g. pressure resisting features
  - B01D35/32 . . . . against radiation
  - B01D35/34 . . . open-topped ([B01D35/31](#) takes precedence)
  
  - B01D36/00** **Filter circuits or combinations of filters with other separating devices**

[N: **Notes**

[N1109]See WARNING after subclass title, particularly item (14)

]

- B01D36/00D . [N: Filters in combination with devices for the removal of gas, air purge systems.]
- B01D36/00L . [N: Filters in combination with devices for the removal of liquids ([B01D35/18B](#) takes precedence)]
- B01D36/00L2 . . [N: Liquid level sensing means, e.g. for water in gasoil-filters] [N1109]
- B01D36/00L4 . . [N: Purge means] [N1109]
- B01D36/00L6 . . [N: Means to filter or treat the separated liquid] [N1109]
- B01D36/02 . Combinations of filters of different kinds ([B01D29/50](#), [B01D33/35](#) take precedence)
- B01D36/04 . Combinations of filters with settling tanks
- B01D36/04B . . [N: Combination of filters with centrifugal separation devices]
- B01D37/00** **Processes of filtration** (processes specially adapted for filtering gases [B01D46/00](#))  
 [N: **Notes**  
 [N1109] See WARNING after subclass title, particularly item (14)  
 ]
- B01D37/02 . Precoating the filter medium; Addition of filter aids to the liquid being filtered [N: (devices for feeding reagents [C02F1/68P](#) and sub-groups; filter aids)]
- B01D37/02B . . [N: additives incorporated in the filter]
- B01D37/03 . using flocculating agents
- B01D37/04 . Controlling the filtration  
 [N: **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. [B01D24/48](#), [B01D29/60](#), [B01D33/80R](#)  
 ]
- B01D37/04C . . [N: by clearness or turbidity measuring]
- B01D37/04F . . [N: by flow measuring]
- B01D37/04L . . [N: by level measuring]
- B01D37/04P . . [N: by pressure measuring]
- B01D37/04T . . [N: by temperature measuring]
- B01D39/00** **Filtering material for liquid or gaseous fluids** [C9503]
- B01D39/02 . Loose filtering material, e.g. loose fibres
- B01D39/04 . . Organic material, e.g. cellulose, cotton
- B01D39/06 . . Inorganic material, e.g. asbestos fibres, glass beads or fibres
- B01D39/08 . Filter cloth, i.e. woven, knitted or interlaced material (metallic [B01D39/10](#))

**[N: WARNING**

[N1112] Groups [B01D39/08B](#) and [B01D39/08D](#) are incomplete pending a reorganisation, see also [B01D39/08](#)

]

- B01D39/08B . . [N: of organic material] [N1112]
- B01D39/08D . . [N: of inorganic material] [N1112]
  
- B01D39/10 . Filter screens essentially made of metal
- B01D39/12 . . of wire gauze; of knitted wire; of expanded metal
  
- B01D39/14 . Other self-supporting filtering material; [N: Other filtering material (non-woven fabrics in general [D04H3/00](#))] [C1112]
- B01D39/16 . . of organic material, e.g. synthetic fibres
- B01D39/16B . . . [N: the material being fibrous ([B01D39/18](#) takes precedence)]
- B01D39/16B2 . . . . [N: of natural origin]
- B01D39/16B4 . . . . [N: of synthetic origin]
- B01D39/16B4B . . . . . [N: sintered or bonded]
- B01D39/16D . . . [N: the material being particulate]
- B01D39/16D2 . . . . [N: of natural origin, e.g. cork or peat]
- B01D39/16D4 . . . . [N: of synthetic origin]
- B01D39/16D4B . . . . . [N: sintered or bonded]
- B01D39/16F . . . [N: Cellular material]
- B01D39/16F2 . . . . [N: of synthetic origin]
- B01D39/16H . . . [N: Wound filtering material]
  
- [N: **WARNING**
- [N1112] 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 [B01D39/16](#) and [L01D239/06H2](#)
- ]
- B01D39/16K . . . [N: Other shaped material, e.g. perforated or porous sheets]
- B01D39/18 . . . the material being cellulose or derivatives thereof ([N: cork or peat [B01D39/16D2](#)]; making filter paper [D21F11/14](#))
- B01D39/20 . . of inorganic material, e.g. asbestos paper, metallic filtering material of non-woven wires (porous ceramic material [N: [C04B38/00](#)]; sintering metals [C22C1/04](#); [N: making porous sintered metal bodies [B22F3/10](#), honeycomb filters [B01D46/24F8](#), materials used for filtering exhaust gases of an internal combustion engine [F01N/022](#), ceramic honeycomb structures [C04B38/00B](#))] [C1112]
- B01D39/20B . . . [N: Glass or glassy material]
- B01D39/20B2 . . . . [N: the material being particulate]
- B01D39/20B2B . . . . . [N: sintered or bonded by inorganic agents]
- B01D39/20B2D . . . . . [N: otherwise bonded, e.g. by resins]
- B01D39/20B4 . . . . [N: the material being filamentary or fibrous]
- B01D39/20B4B . . . . . [N: sintered or bonded by inorganic agents]
- B01D39/20B4D . . . . . [N: otherwise bonded, e.g. by resins]
- B01D39/20D . . . [N: Metallic material]

B01D39/20D2	. . . .	[N: the material being particulate]
B01D39/20D2B	. . . . .	[N: sintered or bonded by inorganic agents]
B01D39/20D2D	. . . . .	[N: otherwise bonded]
B01D39/20D4	. . . . .	[N: the material being filamentary or fibrous]
B01D39/20D4B	. . . . .	[N: sintered or bonded by inorganic agents]
B01D39/20D4D	. . . . .	[N: otherwise bonded]
B01D39/20D6	. . . . .	[N: Metallic foam]
B01D39/20F	. . . .	[N: Carbonaceous material (solid sorbent compositions comprising free carbon <a href="#">B01J20/20</a> )] [C1112]

[N: **WARNING**

[N1112] Groups [B01D39/20F2](#) to [B01D39/20F4](#) are not complete, see also [B01D39/20](#) ]

B01D39/20F2	. . . . .	[N: the material being particulate] [N1112]
B01D39/20F2B	. . . . .	[N: Bonded, e.g. activated carbon blocks] [N1112]
B01D39/20F4	. . . . .	[N: the material being fibrous] [N1112]
B01D39/20H	. . . . .	[N: Other inorganic materials, e.g. ceramics]
B01D39/20H2	. . . . .	[N: the material being particulate or granular]
B01D39/20H2B	. . . . .	[N: sintered or bonded by inorganic agents]
B01D39/20H2D	. . . . .	[N: otherwise bonded, e.g. by resins]
B01D39/20H4	. . . . .	[N: the material being filamentary or fibrous]
B01D39/20H4B	. . . . .	[N: sintered or bonded by inorganic agents]
B01D39/20H4D	. . . . .	[N: otherwise bonded, e.g. by resins]
B01D39/20H6	. . . . .	[N: Ceramic foam]
B01D39/20M	. . . . .	[N: Wound materials]

[N: **WARNING**

[N1112]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 [B01D39/20](#) and [L01D239/06H2](#) ]

**B01D41/00**      **Regeneration of the filtering material or filter elements outside the filter for liquid or gaseous fluids**

B01D41/02	. . . . .	of loose filtering material
B01D41/04	. . . . .	of rigid self-supporting filtering material

**B01D43/00**      **Separating particles from liquids, or liquids from solids, otherwise than by sedimentation or filtration (flotation processes [B03D1/00](#); drying solid materials or objects [F26B](#))**

**Guide heading:** **Separating dispersed particles from gases or vapours** ([suction cleaner filters A47L9/10](#); [filters for breathing-protection purposes A62B23/00](#); [filtering air for vehicles B60H3/06](#); [separating pneumatically-conveyed materials from propelling gas B65G53/60](#); [exhaust or silencing apparatus for machines or engines having means for removing solid constituents of exhaust F01N3/02](#); [air cleaners for the intakes of gas-turbine or jet-propulsion plants F02C7/05](#); [of combustion engines F02M35/024](#); [of compressors F04B39/16](#); [filtering in air-conditioning F24F3/16](#)) [C0204]

**B01D45/00** **Separating dispersed particles from gases or vapours by gravity, inertia, or centrifugal forces**

- B01D45/02 . by utilising gravity
- B01D45/04 . by utilising inertia ([B01D45/12](#) takes precedence)
- B01D45/06 . . by reversal of direction of flow
- B01D45/08 . . by impingement against baffle separators
- B01D45/10 . . . which are wetted
- B01D45/12 . by centrifugal forces ([centrifuges B04B](#); [cyclones B04C](#))
- B01D45/14 . . generated by rotating vanes, discs, drums or brushes
- B01D45/16 . . generated by the winding course of the gas stream, [N: the centrifugal forces being generated solely or partly by mechanical means, e.g. fixed swirl vanes] [C9911]
- B01D45/18 . Cleaning-out devices

**B01D46/00** **Filters [N: i.e. particle separators] or filtering processes specially modified for separating dispersed particles from gases or vapours** ([filtering elements B01D23/00](#) to [B01D35/00](#); [filtering material B01D39/00](#); their regeneration outside the filters [B01D41/00](#)) [C1112]

- B01D46/00B . [N: Making filtering elements] [N0707]
- B01D46/00C . [N: Casings; Housings; Frame constructions] [N0707]
- B01D46/00C10 . . [N: Details of removable closures, lids, caps or filter heads] [N0707]
- B01D46/00C20 . . [N: Mounting of filtering elements within casings, housings or frames ([B01D46/24F8A](#) takes precedence)] [N0707] [C1111]
- B01D46/00C20D . . . [N: Filter elements or cartridges installed in a drawer-like manner] [N1107]
- B01D46/00C20S . . . [N: Two or more filter elements not fluidly connected positioned in the same housing] [N1202]
- B01D46/00C20T . . . [N: Tray-like arrangements of filters in a vessel] [N1107]
- B01D46/00C30 . . [N: Means for connecting filter housings to supports] [N0707]
- B01D46/00C40 . . [N: In-line filters] [N0707]
- B01D46/00C50 . . [N: Modules] [N0707]
- B01D46/00C60 . . [N: Throw-away type filters] [N0707]
- B01D46/00C70 . . [N: Folded frame or housing constructions] [N1107]
- B01D46/00C80 . . [N: Filter elements installed in a branch of a pipe, e.g. with an y-shaped tubular housing] [N1107]

- B01D46/00D . [N: with multiple filtering elements, characterised by their mutual disposition] [N0707]
- B01D46/00D2 . . [N: connected in parallel] [N0707]
- B01D46/00D2A . . . [N: arranged concentrically or coaxially] [N0707]
- B01D46/00D4 . . [N: connected in series] [N0707]
- B01D46/00D4A . . . [N: arranged concentrically or coaxially] [N0707]
- B01D46/00D4P . . . [N: Protecting screens at filter inlet or outlet] [N1107]
  
- B01D46/00F . [N: with additional separating or treating functions] [N0707] [C1107]
- B01D46/00F10 . . [N: provided with antibacterial or antifungal means] [N0707] [C1107]
- B01D46/00F20 . . [N: including coalescing means for the separation of liquid] [N0707] [C1107]
- B01D46/00F20D . . . [N: with collecting, draining means] [N0707]
- B01D46/00F30 . . [N: using electrostatic forces to remove particles, e.g. electret filters] [N0707] [C1107]
- B01D46/00F40 . . [N: using magnetic forces to remove particles] [N0707] [C1107]
- B01D46/00F50 . . [N: by wetting, e.g. using surfaces covered with oil] [N0707]
- B01D46/00F60 . . [N: by adsorption or absorption] [N0707]
- B01D46/00F70 . . [N: with means for influencing the odor, e.g. deodorizing substances] [N1107]
  
- B01D46/00G . [N: with flow guiding by feed or discharge devices] [N0707]
- B01D46/00G2 . . [N: for feeding] [N0707]
- B01D46/00G2B . . . [N: Use of the inlet flow in order to clean the filter surface] [N1107]
- B01D46/00G2C . . . [N: containing fixed gas displacement elements or cores] [N0707]
- B01D46/00G2S . . . [N: by using vanes] [N0707]
- B01D46/00G2T . . . [N: provoking a tangential stream (B01D46/00G2S takes precedence)] [N0707]
- B01D46/00G4 . . [N: for discharging the filtered gas] [N0707]
- B01D46/00G4C . . . [N: containing fixed gas displacement elements or cores] [N0707]
- B01D46/00G6 . . [N: Crossflow filtration, i.e. having an inlet and two outlets] [N1107]
  
- B01D46/00M . [N: with filtering elements moving during filtering operation (B01D46/22, B01D46/32 take precedence)] [N0707]
- B01D46/00M2 . . [N: with vibrating filtering elements] [N0707]
- B01D46/00M4 . . [N: with translational movement] [N0707]
- B01D46/00M6 . . [N: with rotational movement] [N0707]
  
- B01D46/00R . [N: Regenerating the filter material in the filter (B01D46/04, B01D46/48 take precedence)] [N0707]
- B01D46/00R10 . . [N: Devices for taking out of action one or more units of multi-unit filters] [N0707]
- B01D46/00R20 . . [N: Chemical processes for the removal of the retained particles, e.g. by burning of processes] [N0707]
- B01D46/00R20C . . . [N: making use of catalysts] [N0707]
- B01D46/00R20H . . . [N: by heating only] [N0707]
- B01D46/00R30 . . [N: by means of acting on the cake side and moving with respect to the filtering elements] [N0707]
- B01D46/00R30M . . . [N: by scrapers, brushes, nozzles or the like] [N0707]

- B01D46/00R40 . . [N: by acting counter-currently on the filtering surface (e.g. flushing)] [N0707]
- B01D46/00R40A . . . [N: with pressurised gas, e.g. pulsed air] [N0707]
- B01D46/00R40A2 . . . . [N: Using pressurized gas at supersonic velocities] [N1107]
- B01D46/00R40B . . . [N: with backwash arms, shoes or nozzles] [N0707]
- B01D46/00R50 . . [N: by forces created by movement of the filter element] [N0707]
- B01D46/00R50C . . . [N: involving centrifugal forces] [N0707]
- B01D46/00R50V . . . [N: involving vibrations or shaking] [N0707]
- B01D46/00R50V1 . . . . [N: involving sonic or ultrasonic waves] [N0707]
- B01D46/00R60 . . [N: by electrical means, e.g. for the generation of electrostatic forces in order to reject particles] [N0707] [C1107]
- B01D46/00R70 . . [N: by other means not moving with respect to the filtering elements, e.g. fixed nozzles on the cake side] [N0707]
- B01D46/00R80 . . [N: Replacing filter elements] [N0707]
- B01D46/00R90 . . [N: Washing the filter inside the filter housing] [N0906]
- B01D46/00R92 . . [N: Cleaning the filter surface by interrupting suction so that the filter cake falls by gravity] [N1107]
  
- B01D46/00S . . [N: provided with safety means] [N0707]
- B01D46/00S10 . . [N: Filter condition indicators] [N0707]
- B01D46/00S20 . . [N: Bypass or safety valves] [N0707]
- B01D46/00S30 . . [N: Anti-return means] [N0707]
- B01D46/00S40 . . [N: Identification of filter type or position thereof, e.g. by transponders or bar codes] [N0707]
- B01D46/00S50 . . [N: Including arrangements for environmental or personal protection] [N0707]
- B01D46/00S50F . . . [N: against fire or explosion] [N0707]
- B01D46/00S50N . . . [N: against radiation] [N0707]
- B01D46/00S60 . . [N: Means acting upon failure of the filtering system, e.g. in case of damage of the filter elements; Failsafes] [N0906]
- B01D46/00S70 . . [N: Special means for preventing bypass around the filter, i.e. in addition to usual seals] [N1107]
- B01D46/00S80 . . [N: Protecting coverages on the filter which is removed before the filter is used, protection of filter, packaging] [N1107]
  
- B01D46/02 . . Particle separators, e.g. dust precipitators, having hollow filters made of flexible material
- B01D46/02P . . [N: Pockets filters, i.e. multiple bag filters mounted on a common frame] [N1107]
- B01D46/02S . . [N: Means for maintaining a space between filters, e.g. avoiding contact between adjacent filters] [N1107]
- B01D46/04 . . Cleaning filters
- B01D46/06 . . with means keeping the working surfaces flat
- B01D46/08 . . . the working surfaces forming a star shape
  
- B01D46/10 . . Particle separators, e.g. dust precipitators, using filter plates, sheets, or pads having plane surfaces, [N: i.e. axial filtering] [C0707]
- B01D46/10C . . [N: Curved filtering elements] [N0707]
- B01D46/10R . . [N: Ring-shaped filtering elements] [N0707]

- B01D46/12 . . in multiple arrangements
- B01D46/12V . . . [N: V-type arrangements] [N0906]
- B01D46/14 . . arranged in a star shape
- B01D46/16 . . arranged on non-filtering conveyers [N: or supports] [C0707]
  
- B01D46/18 . Particle separators, e.g. dust precipitators, using filtering belts
- B01D46/18F . . [N: Construction of filtering belts or supporting belts including devices for centering, mounting or sealing thereof] [N0707]
- B01D46/20 . . the belts combined with drums
- B01D46/22 . . the belts travelling during filtering
  
- B01D46/24 . Particle separators, e.g. dust precipitators, using rigid hollow filter bodies
- B01D46/24F . . [N: characterised by the physical shape or structure of the filtering element]
- B01D46/24F2 . . . [N: Filter candles]
- B01D46/24F4 . . . [N: Filter cartridges]
- B01D46/24F4C . . . . [N: End caps including additional functions or special forms] [N0707] [C1107]
- B01D46/24F8 . . . . [N: Honeycomb filters (used for filtering exhaust gases of an internal combustion engine [F01N3/022](#); ceramic honeycomb structures per se [C04B38/00B](#))] [N1109]
- B01D46/24F8A . . . . . [N: Mounting of the body within a housing] [N1111]
- B01D46/24F8B . . . . . [N: characterized by parameters related to the physical properties of the honeycomb structure material, e.g. modulus of rupture, porosity] [N1109]
- B01D46/24F8B2 . . . . . [N: of the honeycomb walls or cells] [N1109]
- B01D46/24F8B4 . . . . . [N: of the plugs] [N1109]
- B01D46/24F8B6 . . . . . [N: of the outer peripheral sealing] [N1109]
- B01D46/24F8B8 . . . . . [N: of the adhesive layers, i.e. joints between segments] [N1109]
- B01D46/24F8D . . . . . [N: characterized by the geometrical structure, shape, pattern or configuration or parameters related to the geometry of the structure, e.g. thickness, cell density] [N1109]
- B01D46/24F8D2 . . . . . [N: of the whole honeycomb or segments, e.g. elliptic body, octagonal segment, centre of gravity] [N1109]
- B01D46/24F8D4 . . . . . [N: of the plugs, e.g. projections, gaps, length] [N1109]
- B01D46/24F8D6 . . . . . [N: the outer peripheral sealing, e.g. undulations, thickness] [N1109]
- B01D46/24F8D8 . . . . . [N: of the adhesive layers, i.e. joints between segments, e.g. undulations, thickness] [N1109]
- B01D46/24F8D10 . . . . . [N: of the cells, e.g. diamonds, hexagonal configuration, cell density] [N1109]
- B01D46/24F8D12 . . . . . [N: of the walls along the length of the honeycomb, e.g. inclination from inlet to outlet, length, thickness] [N1109]
  
- B01D46/26 . . rotatable
  
- B01D46/28 . Particle separators, e.g. dust precipitators, using filter brushes
  
- B01D46/30 . Particle separators, e.g. dust precipitators, using loose filtering material
- B01D46/32 . . the material moving during filtering
- B01D46/34 . . . not horizontally, e.g. using shoots
- B01D46/36 . . . as a substantially horizontal layer, e.g. on rotary tables, drums, conveyer belts

- B01D46/38 . . . as fluidised bed
- B01D46/40 . Particle separators, e.g. dust precipitators, using edge filters, i.e. using contiguous impervious surfaces
- B01D46/40H . . [N: of helically or spirally wound bodies] [N0707]
- B01D46/40S . . [N: of stacked bodies] [N0707]
- B01D46/42 . Auxiliary equipment or operation thereof
- B01D46/42E . . [N: Prevention of static charge, e.g. by grounding] [N1107]
- B01D46/42H . . [N: Influencing the heat transfer which act passively, e.g. isolations, heat sinks, cooling ribs] [N1107]
- B01D46/42M . . [N: Manipulating filters or filter elements, e.g. handles or extracting tools] [N1107]
- B01D46/42N . . [N: Reducing noise or vibration emissions] [N1107]
- B01D46/42P . . [N: Means for power supply or devices using electrical power in filters or filter elements] [N1107]
- B01D46/42R . . [N: Allowing or improving visual supervision, e.g. lamps, transparent parts, windows] [N1107]
- B01D46/42T . . [N: Means for active heating or cooling] [N0707] [C1107]
- B01D46/42V . . [N: Special valve constructions adapted to filters or filter elements] [N1107]
- B01D46/42W . . [N: Venturi's or systems showing a venturi effect] [N1107]
- B01D46/42X . . [N: Means for wireless communication] [N1107]
- B01D46/44 . . controlling filtration
- B01D46/44C . . . [N: by measuring the concentration of particles] [N0707]
- B01D46/44F . . . [N: by flow measuring] [N0707]
- B01D46/44P . . . [N: by pressure measuring] [N0707]
- B01D46/44T . . . [N: by temperature measuring] [N0707]
- B01D46/46 . . . automatic
- B01D46/48 . . Removing dust other than cleaning filters [N: e.g. by using collecting trays] [C0707]
- B01D46/50 . . Means for discharging electrostatic potential
- B01D46/52 . Particle separators, e.g. dust precipitators, using filters embodying folded [N: corrugated or wound sheet] material [C0707]
- B01D46/52F . . [N: using folded, pleated material] [N0707]
- B01D46/52F2 . . . [N: with specific folds, e.g. having different lengths] [N0707]
- B01D46/52F4 . . . [N: with means for maintaining spacing between the pleats or folds] [N0707]
- B01D46/52F6 . . . [N: which comprises flutes] [N1107]
- B01D46/52F6S . . . . [N: in stacked arrangement] [N1107]
- B01D46/52F6W . . . . [N: in wound arrangement] [N1107]
- B01D46/52W . . [N: using wound sheets ([B01D46/52F6W](#) takes precedence)] [N0707] [C1107]
- B01D46/54 . Particle separators, e.g. dust precipitators, using ultra-fine filter sheets or diaphragms
- B01D46/54M . . [N: using membranes] [N0707]
- B01D46/54N . . [N: using nano- or microfibres] [N0707]
- B01D47/00** **Separating dispersed particles from gases, air or vapours by liquid as separating agent** ([B01D45/10](#) takes precedence; fractionating columns or parts thereof [B01D3/16](#))

- B01D47/02 . by passing the gas or air or vapour over or through a liquid bath
- [N: **WARNING**  
[N1112]Groups [B01D47/02B](#) to [B01D47/02W](#) are not complete pending reclassification; see also this group  
]
- B01D47/02B . . [N: by bubbling the gas through a liquid bath] [N1112]
- B01D47/02C . . [N: by using a liquid curtain ([B01D47/06](#) takes precedence)] [N1112]
- B01D47/02J . . [N: by impinging the gas to be cleaned essentially in a perpendicular direction onto the liquid surface] [N1112]
- B01D47/02M . . [N: by contacting gas and liquid with a static flow mixer ([B01D47/14](#) takes precedence)] [N1112]
- B01D47/02T . . [N: by directing the gas to be cleaned essentially tangential to the liquid surface] [N1112]
- B01D47/02W . . [N: by directing the gas through a wetted wire mesh or a perforated plate ([B01D47/14](#) takes precedence)] [N1112]
- B01D47/04 . by passing the gas or air or vapour through foam
- B01D47/05 . by condensation of the separating agent
- B01D47/06 . Spray cleaning
- [N: **WARNING**  
[N1203]Groups [B01D47/06C](#) and [B01D47/06V](#) are not complete pending reclassification, see also [B01D47/06](#)  
]
- B01D47/06C . . [N: with two or more jets impinging against each other] [N1201]
- B01D47/06V . . [N: with nozzles using mechanical vibrations] [N1201]
- B01D47/08 . . with rotary nozzles
- [N: **WARNING**  
[M1203]Group [B01D47/08J](#) is not complete pending reclassification, see also [B01D47/08](#)  
]
- B01D47/08J . . . [N: with nozzles which are partly immersed in the washing fluid] [N1112]
- B01D47/10 . Venturi scrubbers
- B01D47/12 . Washers with plural different washing sections ([B01D47/14](#) takes precedence)
- B01D47/14 . Packed scrubbers (packing elements [B01J19/30](#), [B01J19/32](#))
- B01D47/16 . Apparatus having rotary means, other than rotatable nozzles, for atomising the cleaning liquid
- B01D47/18 . . with horizontally-arranged shafts
- B01D49/00 Separating dispersed particles from gases, air or vapours by other methods**
- B01D49/00B . [N: by sedimentation]

B01D49/00D . [N: by sonic or ultrasonic techniques]

B01D49/02 . by thermal repulsion

**B01D50/00 Combinations of devices for separating particles from gases or vapours**

B01D50/00B . [N: Combinations of devices relating to groups [B01D45/00](#) and [B01D46/00](#)]

B01D50/00C . [N: Combinations of devices relating to groups [B01D45/00](#) and [B01D47/00](#)]

B01D50/00D . [N: Combinations of devices relating to groups [B01D46/00](#) and [B01D47/00](#)]

B01D50/00E . [N: Combinations of devices relating to groups [B01D45/00](#) and [B01D46/00](#) and [B01D47/00](#)]

**B01D51/00 Auxiliary pre-treatment of gases or vapours to be cleaned (preventing dust fires A62C; pretreatment specially adapted for magnetic or electrostatic separation B03C) [C0802]**

B01D51/02 . Amassing the particles, e.g. by flocculation [N: (amassing by electric fields [B03C3/017B](#))]

B01D51/04 . . by seeding, e.g. by adding particles

B01D51/06 . . by varying the pressure of the gas or vapour

B01D51/08 . . . by sound or ultrasonics

B01D51/10 . Conditioning the gas to be cleaned

**B01D53/00 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 [B01D5/00](#); sublimation [B01D7/00](#); cold traps, cold baffles [B01D8/00](#); working-up undefined gaseous mixtures obtained by cracking hydrocarbon oils [C10G70/00](#); cleaning coal gas [C10K](#); working-up of natural gas, or synthetic natural gas, [C10L3/10](#); separation of difficult-to-condense gases or air by liquefaction [F25J](#); for investigating materials [G01N30/00](#)) [C9503]**

**Note**

Group [B01D53/34](#) takes precedence over groups [B01D53/02](#) to [B01D53/32](#)

B01D53/00C . [N: by condensation]

B01D53/00H . [N: by heat treatment]

B01D53/00R . [N: by irradiation] [N9503]

B01D53/02 . by adsorption, e.g. preparative gas chromatography [N: (solid sorbent compositions [B01J20/00](#), preparation of inorganic compounds or elements C01)] [C0408]

[N: **Notes** [N0804]

In group [B01D53/02](#) 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 [L01D253/00](#), [L01D256/00](#), [L01D257/00](#) or [L01D259/00](#)

]

- B01D53/02B . . [N: with wetted adsorbents; Chromatography (analytical chromatography [G01N30/00](#) - [G01N30/96](#); for liquids [B01D15/08](#))]
  - B01D53/04 . . with stationary adsorbents [N: ([B01D53/02B](#) takes precedence)] [C0006]
  - B01D53/04C . . . [N: Constructional details of adsorbing systems] [C0804]
  - B01D53/04C2 . . . . [N: Beds in cartridges] [N0804]
  - B01D53/04C4 . . . . [N: Beds in columns] [N0804]
  - B01D53/04C6 . . . . [N: Beds with radial gas flow] [N0804]
  - B01D53/04C8 . . . . [N: Cooling or heating systems] [N0804]
  - B01D53/04C10 . . . . [N: Means for feeding or distributing gases] [N0804]
  - B01D53/04R . . . [N: Controlling adsorption (controlling temperature swing adsorption [B01D53/04T](#), controlling pressure swing adsorption [B01D53/047](#))] [C0804]
- [N: **Notes** [N0804]  
In groups [B01D53/04T](#) and [B01D53/047](#) to [B01D53/047V](#) it is desirable to add indexing codes chosen from [L01D259/40K](#) to [L01D259/40M18D](#) relating to controlling and processing aspects of pressure or temperature swing adsorption ]
- B01D53/04T . . . [N: Temperature swing adsorption] [N9602]
  - B01D53/047 . . . Pressure swing adsorption [N9503]
  - B01D53/047R . . . . [N: Rapid pressure swing adsorption] [N0804]
  - B01D53/047V . . . . [N: Vacuum pressure swing adsorption] [N0804]
  - B01D53/053 . . . . with storage or buffer vessel [N9503]
  - B01D53/06 . . with moving adsorbents, e.g. rotating beds [N: ([B01D53/02B](#) takes precedence)] [C1107]
  - B01D53/08 . . . according to the "moving bed" method
  - B01D53/10 . . . with dispersed adsorbents
  - B01D53/12 . . . . according to the "fluidised technique"
- B01D53/14 . by absorption
  - B01D53/14B . . [N: Multiple stage absorption]
  - B01D53/14C . . [N: Controlling the absorption process]
  - B01D53/14D . . [N: Recovery of products]
  - B01D53/14E . . [N: Regeneration of liquid adsorbents]
  - B01D53/14F . . [N: Pretreatment by other processes]
  - B01D53/14F2 . . . [N: Pretreatment by adsorption]
  - B01D53/14F4 . . . [N: Pretreatment by diffusion]
  - B01D53/14F6 . . . [N: Pretreatment by separation of solid or liquid material]
  - B01D53/14H . . [N: Removing acid components] [N9503] [C1107]
  - B01D53/14H2 . . . [N: Removing mixtures of hydrogen sulfide and carbon dioxide] [N9503] [C1107]
  - B01D53/14H4 . . . [N: Removing hydrogen sulfide] [N9503] [C1107]

- B01D53/14H6 . . . [N: Removing carbon dioxide] [N9503] [C1107]
  - B01D53/14H8 . . . [N: Removing sulfur dioxide or sulfur trioxide] [N9503] [C1107]
  - B01D53/14K . . [N: Removing organic compounds] [N9503] [C1107]
  - B01D53/14M . . [N: Selection of liquid materials for use as absorbents]
- [N: **Note** [N1107]  
In [B01D53/14M](#) it is desirable to add indexing codes for compositional aspects of absorbents. The codes are chosen from [L01D252/00-L01D252/510](#) ]
- B01D53/18 . . Absorbing units; Liquid distributors therefor ([B01D3/16](#), [B01D3/26](#), [B01D3/30](#) take precedence; packing elements [B01J19/30](#), [B01J19/32](#))
  - B01D53/18D . . . [N: Liquid distributors]
- B01D53/22 . by diffusion (manufacturing semi-permeable membranes [B01D67/00](#); form, structure or properties of semi-permeable membranes [B01D69/00](#); material for semi-permeable membranes [B01D71/00](#))
- B01D53/22F . . [N: Multiple stage diffusion]
  - B01D53/22F2 . . . [N: in serial connexion]
  - B01D53/22F4 . . . [N: in parallel connexion]
  - B01D53/22M . . [N: characterised by specific membranes] [N9602]
  - B01D53/22W . . [N: Integrated processes (Diffusion and at least one other process, e.g. adsorption, absorption)]
- B01D53/24 . by centrifugal force ([centrifuges B04B](#); [cyclones B04C](#))
- B01D53/26 . Drying gases or vapours
  - B01D53/26B . . [N: by adsorption]
  - B01D53/26C . . [N: by absorption]
  - B01D53/26D . . [N: by refrigeration (condensation)]
  - B01D53/26E . . [N: by filtration]
  - B01D53/26P . . [N: by diffusion] [N9503]
  - B01D53/28 . . Selection of materials for use as drying agents
- B01D53/30 . Controlling by gas-analysis apparatus ([regulating non electrical variables in general G05D](#))
- B01D53/32 . by electrical effects other than those provided for in group 61/00
  - B01D53/32B . . [N: by electrostatic effects or by high-voltage electric fields]
  - B01D53/32E . . [N: in electrochemical cells] [N9503]
- B01D53/34 . Chemical or biological purification of waste gases [C9503]
  - B01D53/34T . . [N: Heat recovery]
  - B01D53/34Y . . [N: Controlling the process]
  - B01D53/38 . . Removing components of undefined structure [N9503]
  - B01D53/40 . . . Acidic components ([B01D53/44](#) takes precedence) [N9503]
  - B01D53/42 . . . Basic components ([B01D53/44](#) takes precedence) [N9503]
  - B01D53/44 . . . Organic components [N9503]

- B01D53/46 . . Removing components of defined structure [N9503]
- B01D53/48 . . . Sulfur compounds [N9503]
- B01D53/48B . . . . [N: containing only one sulfur compound other than sulfur oxides or hydrogen sulfide] [N9503]
- B01D53/50 . . . . Sulfur oxides ([B01D53/60](#) takes precedence) [N9503]
- B01D53/50B . . . . . [N: by treating the gases with a solution or a suspension of an alkali or earth-alkali or ammonium compound] [N9503]
- B01D53/50B2 . . . . . . [N: characterised by a specific solution or suspension] [N9503]
- B01D53/50B4 . . . . . . [N: characterised by a specific device] [N9503]
- B01D53/50B6 . . . . . . [N: in a spray drying process] [N9602]
- B01D53/50C . . . . . [N: by treating the gases with other liquids] [N9503]
- B01D53/50D . . . . . [N: by treating the gases with solids] [N9503]
- B01D53/52 . . . . Hydrogen sulfide [N9503]
- B01D53/52B . . . . . [N: Mixtures of hydrogen sulfide and sulfur oxides] [N9503]
- B01D53/52C . . . . . [N: Mixtures of hydrogen sulfide and carbon dioxide] [N9503]
- B01D53/54 . . . Nitrogen compounds [N9503]
- B01D53/56 . . . . Nitrogen oxides ([B01D53/60](#) takes precedence) [N9503]
- B01D53/56D . . . . . [N: by treating the gases with solids] [N9602]
- B01D53/58 . . . . Ammonia [N9503]
- B01D53/60 . . . Simultaneously removing sulfur oxides and nitrogen oxides [N9503]
- B01D53/62 . . . Carbon oxides [N9503]
- B01D53/64 . . . Heavy metals or compounds thereof, e.g. mercury [N9503]
- B01D53/66 . . . Ozone [N9503]
- B01D53/68 . . . Halogens or halogen compounds [N9503]
- B01D53/68D . . . . [N: by treating the gases with solids] [N9602]
- B01D53/70 . . . . Organic halogen compounds [N9503]
- B01D53/72 . . . Organic compounds not provided for in groups [B01D53/48](#) to [B01D53/70](#), e.g. hydrocarbons [N9503]
- B01D53/73 . . . After-treatment of removed components [N9503]
- B01D53/74 . . General processes for purification of waste gases; Apparatus or devices specially adapted therefor ([B01D53/92](#) takes precedence) [N9503]
- B01D53/75 . . . Multi-step processes [N9503]
- B01D53/76 . . . Gas phase processes, e.g. by using aerosols [N9503]
- B01D53/77 . . . Liquid phase processes [N9503]
- B01D53/78 . . . . with gas-liquid contact [N9503]
- B01D53/79 . . . . Injecting reactants [N9503]
- B01D53/80 . . . Semi-solid phase processes, i.e. by using slurries [N9503]
- B01D53/81 . . . Solid phase processes [N9503]
- B01D53/82 . . . . with stationary reactants [N9503]
- B01D53/83 . . . . with moving reactants [N9503]
- B01D53/84 . . . Biological processes [N9503]
- B01D53/85 . . . . with gas-solid contact [N9503]
- B01D53/86 . . . Catalytic processes [N9503]

B01D53/86B	. . . . .	[N: Removing sulfur compounds] [N9503]
B01D53/86B2	. . . . .	[N: only one sulfur compound other than sulfur oxides or hydrogen sulfide] [N9503]
B01D53/86B4	. . . . .	[N: Sulfur oxides] [N9503]
B01D53/86B6	. . . . .	[N: Hydrogen sulfide] [N9503]
B01D53/86B6B	. . . . .	[N: Mixtures of hydrogen sulfide and sulfur oxides] [N9503]
B01D53/86B6C	. . . . .	[N: Mixtures of hydrogen sulfide and carbon dioxides] [N9503]
B01D53/86F	. . . . .	[N: Removing nitrogen compounds] [N9503]
B01D53/86F2	. . . . .	[N: Nitrogen oxides] [N9503]
B01D53/86F2C	. . . . .	[N: Processes characterised by a specific catalyst] [N9503]
B01D53/86F2D	. . . . .	[N: Processes characterised by a specific device] [N9503]
B01D53/86F4	. . . . .	[N: Ammonia] [N9503]
B01D53/86G	. . . . .	[N: Simultaneously removing sulfur oxides and nitrogen oxides] [N9503]
B01D53/86H	. . . . .	[N: Removing carbon monoxide or hydrocarbons] [N9503] [C1107]
B01D53/86K	. . . . .	[N: Removing mixtures of carbon monoxide or hydrocarbons and nitrogen oxides] [N9503]
B01D53/86K2	. . . . .	[N: Simultaneous elimination of the components ( <a href="#">B01D53/86K4</a> takes precedence)] [N9503]
B01D53/86K2C	. . . . .	[N: characterised by a specific catalyst] [N9503]
B01D53/86K2D	. . . . .	[N: characterised by a specific device] [N9503]
B01D53/86K4	. . . . .	[N: Successive elimination of the components] [N9503]
B01D53/86L	. . . . .	[N: Removing halogens or halogen compounds] [N9503]
B01D53/86L2	. . . . .	[N: Organic halogen compounds] [N9503]
B01D53/86N	. . . . .	[N: Removing heavy metals or compounds thereof, e.g. mercury] [N9503]
B01D53/86P	. . . . .	[N: Removing organic compounds not provided for in <a href="#">B01D53/86B</a> to <a href="#">B01D53/86N</a> ] [N9503]
B01D53/86Q	. . . . .	[N: Removing components of defined structure not provided for in <a href="#">B01D53/86B</a> to <a href="#">B01D53/86P</a> ] [N9503]
B01D53/86Q2	. . . . .	[N: Ozone] [N9503]
B01D53/86R	. . . . .	[N: Removing components of undefined structure] [N9503]
B01D53/86R2	. . . . .	[N: Acidic components ( <a href="#">B01D53/86R6</a> takes precedence)] [N9503]
B01D53/86R4	. . . . .	[N: Basic components ( <a href="#">B01D53/86R6</a> takes precedence)] [N9503]
B01D53/86R6	. . . . .	[N: Organic components] [N9503]
B01D53/86V	. . . . .	[N: Multiple step processes] [N9503]
B01D53/86W	. . . . .	[N: After-treatment of removed components] [N9503]
B01D53/86Y	. . . . .	[N: Controlling the catalytic process] [N9503]
B01D53/88	. . . . .	Handling or mounting catalysts [N9503]
B01D53/88B	. . . . .	[N: Devices in general for catalytic purification of waste gases] [N9503]
B01D53/90	. . . . .	Injecting reactants [N9503]
B01D53/92	. . . . .	of engine exhaust gases ( <a href="#">exhaust</a> [N: or silencing] apparatus [N: for internal combustion engines, machines or engines in general], <a href="#">having means for purifying</a> , [N: rendering innocuous] or <a href="#">otherwise treating exhaust gases</a> <a href="#">F01N3/00</a> ) [N9503] [C9702]
B01D53/92K	. . . . .	[N: Mixtures of carbon monoxide or hydrocarbons and nitrogen oxides] [N9503]

- B01D53/92K2 . . . . [N: Simultaneous elimination of carbon monoxide or hydrocarbons and nitrogen oxides] [N9503]
- B01D53/92K4 . . . . [N: Successive elimination of carbon monoxide or hydrocarbons and nitrogen oxides] [N9503]
- B01D53/94 . . . . by catalytic processes [N9503]
- B01D53/94F . . . . [N: Removing only nitrogen compounds] [N9503] [C1107]
- B01D53/94F2 . . . . . [N: Nitrogen oxides] [N9503]
- B01D53/94F2C . . . . . [N: Processes characterised by a specific catalyst] [N9503]
- [N: **WARNING** [N1107]  
Groups [B01D53/94F2C2](#) to [B01D53/94F2C6](#) are not complete pending a reorganisation. See also [B01D53/94F2C](#) ]
- B01D53/94F2C2 . . . . . {7 dots} [N: for removing nitrogen oxides by selective catalytic reduction (SCR) using a reducing agent in a lean exhaust gas] [N1107]
- B01D53/94F2C4 . . . . . {7 dots} [N: for removing nitrogen oxides by NO<sub>x</sub> storage or reduction by cyclic switching between lean and rich exhaust gases (LNT, NSC, NSR)] [N1107]
- B01D53/94F2C6 . . . . . {7 dots} [N: for removing nitrous oxide] [N1107]
- B01D53/94F2D . . . . . [N: Processes characterised by a specific device] [N9503]
- B01D53/94F4 . . . . . [N: Ammonia] [N9503]
- B01D53/94H . . . . . [N: Simultaneously removing carbon monoxide, hydrocarbons or carbon making use of oxidation catalysts (**three-way-catalysts (TWC)** [B01D53/94L](#))] [N9506] [C1107]
- B01D53/94L . . . . . [N: Simultaneously removing carbon monoxide, hydrocarbons or nitrogen oxides making use of three-way catalysts (TWC) or four-way-catalysts (FWC)] [N1107]
- [N: **WARNING** [N1107]  
Groups [B01D53/94L2](#) and [B01D53/94L4](#) are not complete pending a reorganisation. See also [B01D53/94L](#) ]
- B01D53/94L2 . . . . . [N: characterised by a specific catalyst] [N1107]
- B01D53/94L4 . . . . . [N: characterised by a specific device] [N1107]
- B01D53/94M . . . . . [N: 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** [B01D53/94F2C](#), [B01D53/94H](#) or [B01D53/94L2](#))] [N1107]
- [N: **WARNING** [N1107]  
Groups [B01D53/94M](#) to [B01D53/94M4](#) are not complete pending a reorganisation. See also [B01D53/94M](#) ]
- B01D53/94M2 . . . . . [N: with catalysts positioned on one brick] [N1107]
- B01D53/94M2L . . . . . [N: in different layers] [N1107]
- B01D53/94M2Z . . . . . [N: in different zones] [N1107]
- B01D53/94M4 . . . . . [N: with catalysts positioned on separate bricks, e.g. exhaust systems] [N1107]
- B01D53/94P . . . . . [N: Catalyst preceded by an adsorption device without catalytic function for temporary storage of contaminants, e.g. during cold start] [N1107]

[N: **WARNING** [N1107]

Groups [B01D53/94P2](#) and [B01D53/94P4](#) are not complete pending a reorganisation. See also [B01D53/94P](#)

]

- B01D53/94P2 . . . . . [N: for storing hydrocarbons] [N1107]
- B01D53/94P4 . . . . . [N: for storing sulfur oxides] [N1107]
- B01D53/94Y . . . . . [N: Controlling the catalytic process] [N9908]
- B01D53/96 . . . . . Regeneration, reactivation or recycling of reactants [N9503]
- B01D53/96E . . . . . [N: including an electrochemical process step] [N9702]
  
- B01D57/00**                    **Separation, other than separation of solids, not fully covered by a single other group or subclass, e.g. [B03C](#)**
  
- B01D57/02 . . . . . by electrophoresis (treatment of water, waste water, sewage or sludge by electrophoresis [C02F1/469](#); electrophoretic production of compounds or non-metals [C25B7/00](#); investigating or analysing materials by using electrophoresis [G01N27/26](#))
  
- B01D59/00**                    **Separation of different isotopes of the same chemical element (preventing occurrence of critical conditions when producing fissile material G21; shielding from radioactivity G21F)**
  
- B01D59/02 . . . . . Separation by phase transition
- B01D59/04 . . . . . by distillation
- B01D59/06 . . . . . by fractional melting; by zone melting
- B01D59/08 . . . . . by fractional crystallisation, by precipitation, by zone freezing
  
- B01D59/10 . . . . . Separation by diffusion
- B01D59/12 . . . . . by diffusion through barriers
- B01D59/14 . . . . . Construction of the barrier
- B01D59/16 . . . . . by thermal diffusion
- B01D59/18 . . . . . by separation jets
  
- B01D59/20 . . . . . Separation by centrifuging
  
- B01D59/22 . . . . . Separation by extracting
- B01D59/24 . . . . . by solvent extraction
- B01D59/26 . . . . . by sorption, i.e. absorption, adsorption, persorption
  
- B01D59/28 . . . . . Separation by chemical exchange
- B01D59/30 . . . . . by ion exchange
- B01D59/32 . . . . . by exchange between fluids
- B01D59/33 . . . . . involving dual temperature exchange
  
- B01D59/34 . . . . . Separation by photochemical methods
  
- B01D59/36 . . . . . Separation by biological methods

- B01D59/38 . Separation by electrochemical methods (in general [B01J](#))
- B01D59/40 . . by electrolysis
- B01D59/42 . . by electromigration; by electrophoresis
- B01D59/44 . Separation by mass spectrography (particle spectrometer or separator tubes [H01J49/00](#))
- B01D59/46 . . using only electrostatic fields
- B01D59/48 . . using electrostatic and magnetic fields
- B01D59/50 . Separation involving two or more processes covered by different groups selected from groups [B01D59/02](#), [B01D59/10](#), [B01D59/20](#), [B01D59/22](#), [B01D59/28](#), [B01D59/34](#), [B01D59/36](#), [B01D59/38](#), [B01D59/44](#)

**Guide heading:** **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 [B01D53/22](#); treatment of milk by dialysis, reverse osmosis or ultrafiltration [A23C9/142](#), by electro dialysis [A23C9/144](#); artificial kidneys [A61M1/14](#); [N: manufacture of films of plastics [B29, C08J5/18](#), of ion-exchange membranes [C08J5/22](#)]; treatment of water by dialysis, osmosis or reverse osmosis [C02F1/44](#), by electro dialysis [C02F1/469](#); apparatus for enzymology or microbiology with dialysis means [C12M1/12](#); 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 [C25B13/00](#), [C25C7/04](#); osmosis as energy source [F03G7/00](#))

[N: **WARNING**

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

]

**Note**

In groups [B01D61/00](#) to [B01D71/00](#), in the absence of an indication to the contrary, classification is made in the last appropriate place (in respect of [B01D71/00](#), see also Note (1) following that group)

**B01D61/00** **Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, ultrafiltration; Apparatus, accessories or auxiliary operations specially adapted therefor**

[N: **Note**

In groups [B01D61/00](#) to [B01D61/58](#) it is desirable to add the indexing codes relating to process operations and control chosen from groups [L01D311/00](#) to [L01D311/26Z](#), to details relating to membrane modules and apparatus indexing codes chosen from [L01D313/00](#) to [L01D313/52](#), to details relating to the membrane module operation indexing codes chosen from [L01D315/00](#) to [L01D315/16](#), to details relating to the module arrangement within a plant or an apparatus indexing codes chosen from [L01D317/00](#) to [L01D317/08](#) and to details relating to the membrane assembly within one housing indexing codes chosen from [L01D319/00](#) to [L01D319/04F](#) [N0710]

]

- B01D61/00B . [N: Forward osmosis, direct osmosis (actuators for pressure retarded osmosis [F03G7/00C](#))] [N1202]

- B01D61/00B10 . . [N: Osmotic agents, draw solutions] [N1202]
- B01D61/00D . [N: Separation by stereostructure, steric separation] [N1202]
- B01D61/02 . Reverse osmosis; Hyperfiltration; [N: Nanofiltration] [C0710]
- B01D61/02B . . [N: comprising multiple reverse osmosis, hyperfiltration or nanofiltration steps] [C0710]
- B01D61/02D . . [N: Reverse osmosis; Hyperfiltration (B01D61/02B takes precedence)] [C0710]
- B01D61/02F . . [N: Nanofiltration (B01D61/02B takes precedence)] [N0710]
- B01D61/04 . . Feed pretreatment
- B01D61/06 . . Energy recovery
- B01D61/08 . . Apparatus therefor
- B01D61/10 . . Accessories; Auxiliary operations
- B01D61/12 . . Controlling or regulating
- B01D61/14 . Ultrafiltration; Microfiltration
- B01D61/14B . . [N: comprising multiple ultrafiltration or microfiltration steps]
- B01D61/14D . . [N: Ultrafiltration (B01D61/14B takes precedence)] [N0710]
- B01D61/14F . . [N: Microfiltration (B01D61/14B takes precedence)] [N0710]
- B01D61/16 . . Feed pretreatment
- B01D61/18 . . Apparatus therefor
- B01D61/20 . . Accessories; Auxiliary operations
- B01D61/22 . . Controlling or regulating
- B01D61/24 . Dialysis; [N: Membrane extraction (dialysate solution flow [A61M1/16D2](#))] [C0710]
- B01D61/24B . . Dialysis [N0710]
- B01D61/24D . . Membrane extraction [N0710]
- B01D61/28 . . Apparatus therefor
- B01D61/30 . . Accessories; Auxiliary operations
- B01D61/32 . . Controlling or regulating [N: (Measuring ultrafiltrate during dialysis [A61M1/16](#))]
- B01D61/36 . Pervaporation; Membrane distillation; Liquid permeation
- B01D61/36B . . [N: Pervaporation] [N0710]
- B01D61/36D . . [N: Membrane distillation] [N0710]
- B01D61/36J . . [N: Apparatus therefor] [N1202]
- B01D61/36L . . [N: Accessories; Auxiliary operations] [N1202]
- B01D61/38 . Liquid-membrane separation
- B01D61/40 . . using emulsion-type membranes
- B01D61/42 . Electrodialysis; Electro-osmosis [N: Electro-ultrafiltration]
- B01D61/42A . . [N: Electrodialysis] [N0710]
- B01D61/42B . . [N: Electro-ultrafiltration]
- B01D61/42D . . [N: Electro-osmosis] [N0710]
- B01D61/44 . . Ion-selective electrodialysis

- B01D61/44B . . . [N: with bipolar membranes; Water splitting]
- B01D61/46 . . . Apparatus therefor
- B01D61/48 . . . . having one or more compartments filled with ion-exchange material [N: e.g. electrodeionisation] [C1202]
- B01D61/48B . . . . . [N: Specific features relating to the ion-exchange material] [N0810]
- B01D61/50 . . . . Stacks of the plate-and-frame type
- B01D61/52 . . . Accessories; Auxiliary operations
- B01D61/54 . . . Controlling or regulating
- B01D61/56 . . Electro-osmotic de-watering
  
- B01D61/58 . Multistep processes [N: (comprising reverse osmosis or hyperfiltration steps [B01D61/02B](#); comprising ultrafiltration or microfiltration steps [B01D61/14B](#))]

[N: **Notes**

In group [B01D61/58](#) specific process steps within the multistep process are indexed by codes chosen from [L01D61/02](#) to [L01D61/56](#) [N0710]  
]

**B01D63/00 Apparatus in general for separation processes using semi-permeable membranes**

[N: **Note**

In groups [B01D63/00](#) to [B01D63/16](#) it is desirable to add the indexing codes relating to membrane modules and apparatus chosen from groups [L01D313/00](#) to [L01D313/52](#), to details relating to the membrane module operation indexing codes chosen from [L01D315/00](#) to [L01D315/16](#), to details relating to the module arrangement within a plant or an apparatus indexing codes chosen from [L01D317/00](#) to [L01D317/08](#) and to details relating to the membrane assembly within one housing indexing codes are chosen from [L01D319/00](#) to [L01D319/04F](#) [N0710]  
]

- B01D63/00L . [N: Microfluidic devices comprising semi-permeable hollow fibre membranes] [N1202]
- B01D63/02 . Hollow fibre modules
- B01D63/02B . . [N: Manufacturing thereof]
- B01D63/02B10 . . . [N: Encapsulating hollow fibres]
- B01D63/02B10B . . . . [N: Materials therefor]
- B01D63/02D . . [N: with a single potted end or U-shaped] [C0710]
- B01D63/02F . . [N: Bobbin units] [N0710]
- B01D63/02H . . [N: Wafer type modules or flat-surface type modules] [N0710]
- B01D63/02J . . [N: Twinned or braided type modules] [N0710]
- B01D63/02L . . [N: Microfluidic devices comprising semi-permeable hollow fibre membranes] [N1202]
- B01D63/02M . . [N: Microfluidic devices comprising semi-permeable hollow fibre membranes] [N1202]
- B01D63/04 . . comprising multiple hollow fibre assemblies
- B01D63/04B . . . [N: with separate tube sheets]
- B01D63/04D . . . [N: in separate housings]
- B01D63/06 . Tubular membrane modules

- B01D63/06B . . [N: Manufacturing thereof]
- B01D63/06D . . [N: with membranes on a surface of a support tube]
- B01D63/06D10 . . . [N: on the inner surface thereof]
- B01D63/06D12 . . . [N: on the outer surface thereof]
- B01D63/06F . . [N: with a porous block having membrane coated passages]
- B01D63/06H . . [N: with pleated membranes]
- B01D63/06J . . [N: with flexible membrane tubes]
  
- B01D63/08 . Flat membrane modules
- B01D63/08B . . [N: Manufacturing thereof]
- B01D63/08D . . [N: comprising a stack of flat membranes, e.g. plate-and-frame devices]
- B01D63/08D10 . . . [N: at least one flow duct intersecting the membranes]
- B01D63/08D10B . . . . [N: specially adapted for two fluids in mass exchange flow]
- B01D63/08F . . [N: Single membrane modules] [N0710]
- B01D63/08H . . [N: Microfluidic devices comprising semi-permeable flat membranes] [N1202]
  
- B01D63/10 . Spiral-wound membrane modules
- B01D63/10B . . [N: Details relating to membrane envelopes] [N0710]
- B01D63/10D . . [N: Anti-Telescopic-Devices (ATD)] [N0710]
- B01D63/12 . . comprising multiple spiral-wound assemblies
  
- B01D63/14 . Pleat-type membrane modules
  
- B01D63/16 . Rotary, reciprocated or vibrated modules
  
- B01D65/00** **Accessories or auxiliary operations, in general, for separation processes or apparatus using semi-permeable membranes**
  
- B01D65/00B . [N: Membrane bonding or sealing]
- B01D65/00S . [N: Membrane storage] [N0710]
- B01D65/02 . Membrane cleaning or sterilisation [N: ; Membrane regeneration] [C0710]
  
- [N: **Note** [C0711]  
In group [B01D65/02](#) it is desirable to add the indexing codes relating to membrane cleaning, regeneration, sterilization and prevention of membrane fouling chosen from groups [L01D321/00](#) to [L01D321/28](#)  
]
- B01D65/02B . . [N: Membrane sterilisation]
- B01D65/02F . . [N: Removal of membrane elements before washing] [N0710]
- B01D65/02H . . [N: Cleaning of other parts of the apparatus than the membrane] [N0710]
- B01D65/04 . . with movable bodies, e.g. foam balls
  
- [N: **WARNING**  
Group [B01D65/04](#) 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 [N0710]  
]

- B01D65/06 . . with special washing compositions
- [N: **WARNING**  
Group [B01D65/06](#) 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 [N0710]  
]
- B01D65/08 . Prevention of membrane fouling or of concentration polarisation
- [N: **Notes**  
In group [B01D65/08](#) it is desirable to add the indexing codes relating to membrane cleaning, regeneration, sterilization and prevention of membrane fouling chosen from groups [L01D321/00](#) to [L01D321/28](#) [N0710]  
]
- B01D65/10 . Testing of membranes or membrane apparatus; Detecting or repairing leaks
- [N: **Note**  
The documents classified in the groups [B01D67/00](#) to [B01D71/00](#) are also searchable in a keyword-based electronic off-line database called "MEMBRANE"  
]
- B01D65/10B . . [N: Detection of leaks in membranes] [N0710]
- B01D65/10D . . [N: Detection of leaks in membrane apparatus or modules] [N0710]
- B01D65/10F . . [N: Repairing membrane apparatus or modules] [N0710]
- B01D65/10F10 . . . [N: Repairing membranes] [N0710]
- B01D67/00** **Processes specially adapted for manufacturing semi-permeable membranes for separation processes or apparatus**
- [N: **Note**  
In group [B01D67/00](#) it is desirable to add the indexing codes relating to membrane preparation chosen from groups [L01D323/00](#) to [L01D323/42](#) [N0710]  
]
- B01D67/00K . [N: Organic membrane formation] [N0609]
- B01D67/00K10 . . [N: by agglomeration of particles, e.g. sintering] [N0609]
- B01D67/00K12 . . [N: by chemical reactions (in-situ polymerisation, polycondensation, cross-linking or reaction for manufacturing composite membranes B01D69/12D)] [N0609]
- B01D67/00K14 . . [N: by phase separation, sol-gel transition, evaporation or solvent quenching] [N0609]
- B01D67/00K14B . . . [N: Casting solutions therefor] [N0609]
- B01D67/00K14D . . . [N: Casting processes (hollow fibre membrane manufacturing methods B01D69/08)] [N0609]
- B01D67/00K14F . . . [N: Coagulation] [N0609]
- B01D67/00K14H . . . [N: Thermally induced processes] [N0609]
- B01D67/00K16 . . [N: from melts] [N0609]
- B01D67/00K18 . . [N: by inducing porosity into non porous precursor membranes] [N0609]
- B01D67/00K18B . . . [N: by mechanical treatment, e.g. pore-stretching] [N0609]
- B01D67/00K18B10 . . . . [N: by stretching] [N1202]

- B01D67/00K18D . . . [N: by selective elimination of components, e.g. by leaching] [N0609]
- B01D67/00K18F . . . [N: by elimination of segments of the precursor, e.g. nucleation-track membranes, lithography or laser methods] [N0609]
- B01D67/00K18F2 . . . . [N: by micromachining techniques, e.g. using masking and etching steps, photolithography] [N0609]
- B01D67/00K20 . . [N: by deposition from the gaseous phase, e.g. CVD, PVD] [N1202]
  
- B01D67/00M . [N: Inorganic membrane formation] [N0609]
- B01D67/00M10 . . [N: by agglomeration of particles in the dry state, e.g. sintering] [N0609]
- B01D67/00M11 . . [N: by chemical reaction] [N0703]
- B01D67/00M12 . . [N: by slurry techniques, e.g. die or slip-casting] [N0609]
- B01D67/00M14 . . [N: by sol-gel transition] [N0609]
- B01D67/00M16 . . [N: by controlled crystallisation, e.g. hydrothermal growth] [N0609]
- B01D67/00M18 . . [N: by inducing porosity into non porous precursor membranes] [N0609]
- B01D67/00M18B . . . [N: by mechanical treatment] [N0609]
- B01D67/00M18D . . . [N: by selective elimination of components, e.g. by leaching] [N0609]
- B01D67/00M18F . . . [N: by elimination of segments of the precursor, e.g. nucleation-track membranes, lithography or laser methods] [N0609]
- B01D67/00M18F2 . . . . [N: by micromachining techniques, e.g. using masking and etching steps, photolithography] [N0609]
- B01D67/00M18F4 . . . . [N: by anodic oxidation] [N0703]
- B01D67/00M20 . . [N: by carbonisation or pyrolysis] [N0609]
- B01D67/00M22 . . [N: by deposition from the liquid phase, e.g. electrochemical deposition (B01D67/00M12 takes precedence)] [N0609]
- B01D67/00M24 . . [N: by deposition from the gaseous phase, e.g. sputtering, CVD, PVD] [N0609]
- B01D67/00M28 . . [N: from melts] [N0703]
- B01D67/00M40 . . [N: Pretreatment of inorganic membrane material prior to membrane formation e.g. coating of metal powder] [N1202]
  
- B01D67/00P . [N: Formation of membranes comprising organic and inorganic components] [N0609]
  
- B01D67/00R . [N: After-treatment of organic or inorganic membranes] [N0609]
- B01D67/00R10 . . [N: Thermal after-treatment] [N0609]
- B01D67/00R12 . . [N: Mechanical after-treatment] [N0609]
- B01D67/00R14 . . [N: Physical treatment with compounds, e.g. swelling, coating or impregnation (involving chemical reactions B01D67/00R18)] [N0609]
- B01D67/00R16 . . [N: with wave-energy, particle-radiation or plasma] [N0609]
- B01D67/00R18 . . [N: Chemical modification] [N0609]
- B01D67/00R20 . . [N: Drying] [N0609]
- B01D67/00R22 . . [N: Storing or preservation] [N0609]

**B01D69/00**      **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 [B01D67/00](#)

[N: **WARNING** [C0810]

The following sub-groups of [B01D69/00](#) are incomplete. Documents presently classified in the hierarchically higher groups are in the process of reclassification

[B01D69/04B](#)  
[B01D69/04D](#)  
[B01D69/08B](#)  
[B01D69/08D](#)  
[B01D69/08E](#)  
[B01D69/08F](#)  
[B01D69/08H](#)  
[B01D69/08H10](#)  
[B01D69/10B](#)  
[B01D69/14B](#)  
[B01D69/14B10B](#)  
[B01D69/14B12](#)  
[B01D69/14B14](#)  
[B01D69/14B16](#)

]

[B01D69/02](#) . characterised by their properties

[N: **Note**

In group [B01D69/02](#) it is desirable to add the indexing codes relating to properties of membranes chosen from groups [L01D325/00](#) to [L01D325/38](#) [N0710]

]

[B01D69/04](#) . Tubular membranes

[B01D69/04B](#) . . [N: characterised by the tube diameter] [N0710]

[B01D69/04D](#) . . [N: characterised by the cross-sectional shape of the tube] [N0710]

[B01D69/06](#) . Flat membranes

[B01D69/08](#) . Hollow fibre membranes ([manufacture of hollow fibres](#) [D01D5/24](#), [D01F1/08](#))

[B01D69/08B](#) . . [N: characterised by the fibre diameter] [N0710]

[B01D69/08D](#) . . [N: characterised by the cross-sectional shape of the fibre] [N0710]

[B01D69/08E](#) . . [N: **Undulated fibres**] [N0810]

[B01D69/08F](#) . . [N: Details relating to the spinneret] [N0710]

[B01D69/08H](#) . . [N: Details relating to the spinning process] [N0710]

[B01D69/08H10](#) . . . [N: Co-extrusion; Co-spinning] [N0710]

[B01D69/10](#) . Supported membranes; Membrane supports

[B01D69/10B](#) . . [N: Support pretreatment] [N0710]

- B01D69/12 . Composite membranes; Ultra-thin membranes
- B01D69/12B . . [N: Separate manufacturing of ultra-thin membranes]
- B01D69/12D . . [N: In-situ manufacturing by polymerisation, polycondensation, cross-linking, and/or reaction]
- B01D69/12D10 . . . [N: using electrical discharge or plasma-polymerisation]
- B01D69/14 . Dynamic membranes
- B01D69/14B . . [N: Heterogeneous membranes, e.g. containing dispersed material; Mixed matrix membranes] [C0710]
- B01D69/14B10 . . . [N: with "carriers"]
- B01D69/14B10B . . . . [N: containing embedded or bound biomolecules] [N0710]
- B01D69/14B12 . . . [N: containing embedded catalysts] [N0710]
- B01D69/14B14 . . . [N: containing embedded adsorbents] [N0710]
- B01D69/14B16 . . . [N: Organic/inorganic mixed matrix membranes] [N0710]

**B01D71/00**      **Semi-permeable membranes for separation processes or apparatus characterised by the material; Manufacturing processes specially adapted therefor**

**Note**

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 [B01D61/00](#)). 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 [B01D67/00](#)

- B01D71/02 . Inorganic material
- B01D71/02C . . [N: Carbon] [N9710]
- B01D71/02M . . [N: Metals] [N9710]
- B01D71/02P . . [N: Oxides] [N9710]
- B01D71/02P2 . . . [N: Aluminium oxide] [N9710]
- B01D71/02P4 . . . [N: Silicium oxide] [N9710]
- B01D71/02Z . . [N: Molecular sieves, e.g. zeolites, silicalite ([B01D71/02C](#) takes precedence)] [N9710]
- B01D71/04 . . Glass
- B01D71/06 . Organic material
- B01D71/08 . . Polysaccharides
- B01D71/10 . . . Cellulose; Modified cellulose
- B01D71/12 . . . Cellulose derivatives
- B01D71/14 . . . . Esters of organic acids
- B01D71/16 . . . . . Cellulose acetate
- B01D71/18 . . . . . Mixed esters, e.g. cellulose acetate-butyrate

- B01D71/20 . . . . Esters of inorganic acids, e.g. cellulose nitrate
- B01D71/22 . . . . Cellulose ethers
- B01D71/24 . . Rubbers

**Note**

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

- "rubber" covers:

1. natural or conjugated diene rubber;
2. rubber in general

(for specific rubber, see the group provided for such macromolecular compound)

- B01D71/26 . . Polyalkenes
- B01D71/28 . . Polymers of vinyl aromatic compounds
- B01D71/30 . . Polyalkenyl halides
- B01D71/32 . . . containing fluorine atoms
- B01D71/34 . . . . Polyvinylidene fluoride
- B01D71/36 . . . . Polytetrafluoroethene
- B01D71/38 . . Polyalkenylalcohols; Polyalkenylesters; Polyalkenylethers; Polyalkenylaldehydes; Polyalkenylketones; Polyalkenylacetals; Polyalkenylketals
- B01D71/40 . . Polymers of unsaturated acids or derivatives thereof, e.g. salts, amides, imides, nitriles, anhydrides, esters
- B01D71/42 . . . Polymers of nitriles, e.g. polyacrylonitrile
- B01D71/44 . . Polymers obtained by reactions only involving carbon-to-carbon unsaturated bonds, not provided for in a single one of groups [B01D71/26](#) to [B01D71/42](#)
- B01D71/46 . . Epoxy resins
- B01D71/48 . . Polyesters
- B01D71/50 . . Polycarbonates
- B01D71/52 . . Polyethers
- B01D71/54 . . Polyureas; Polyurethanes
- B01D71/56 . . Polyamides, e.g. polyester-amides
- B01D71/58 . . Other polymers having nitrogen in the main chain, with or without oxygen or carbon only
- B01D71/60 . . . Polyamines
- B01D71/62 . . . Polycondensates having nitrogen-containing heterocyclic rings in the main chain
- B01D71/64 . . . . Polyimides; Polyamide-imides; Polyester-imides; Polyamide acids or similar polyimide precursors
- B01D71/66 . . Polymers having sulfur in the main chain, with or without nitrogen, oxygen or carbon only
- B01D71/68 . . . Polysulfones; Polyethersulfones
- B01D71/70 . . Polymers having silicon in the main chain, with or without sulfur, nitrogen, oxygen or carbon only
- B01D71/72 . . Macromolecular compounds obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds, not provided for in a single one of the groups [B01D71/46](#) to [B01D71/70](#)

- B01D71/74 . . Natural macromolecular material or derivatives thereof ([B01D71/08](#), [B01D71/24](#) take precedence)
- B01D71/76 . . Macromolecular material not specifically provided for in a single one of groups [B01D71/08](#) to [B01D71/74](#) (rubbers in general [B01D71/24](#))
- B01D71/78 . . . Graft polymers
- B01D71/80 . . . Block polymers
- B01D71/82 . . . characterised by the presence of specified groups, e.g. introduced by chemical after-treatment