

## B04 CENTRIFUGAL APPARATUS OR MACHINES FOR CARRYING-OUT PHYSICAL OR CHEMICAL PROCESSES

### Note

Attention is drawn to the Notes following the subsection title "SEPARATING; MIXING". [4]

**B04B CENTRIFUGES** (high-speed drum mills B02C 19/11; domestic spin driers D06F; analysing, measuring or monitoring physical or chemical properties of samples during centrifuging, see the relevant subclasses for these procedures, e.g. G01N)

### Note

This subclass covers machines or apparatus for separating, mixing, drying, extracting, purifying, or like treating in which centrifugal effects are generated by rotary bowls or other rotors. Where such machines or apparatus involve pumping effects, such effects must be incidental or subsidiary to the treating.

### Types of centrifuges: Centrifuges characterised by discharging means

#### **1/00 Centrifuges with rotary bowls provided with solid jackets for separating predominantly liquid mixtures with or without solid particles**

- 1/02 . without inserted separating walls
- 1/04 . with inserted separating walls
- 1/06 . . of cylindrical shape
- 1/08 . . of conical shape
- 1/10 . with discharging outlets in the plane of the maximum diameter of the bowl
- 1/12 . . with continuous discharge
- 1/14 . . with periodical discharge
- 1/16 . . . with discharging outlets controlled by the rotational speed of the bowl
- 1/18 . . . . controlled by the centrifugal force of an auxiliary liquid
- 1/20 . discharging solid particles from the bowl by a conveying screw coaxial with the bowl axis and rotating relatively to the bowl

#### **3/00 Centrifuges with rotary bowls in which solid particles or bodies become separated by centrifugal force and simultaneously sifting or filtering**

- 3/02 . discharging solid particles from the bowl by means co-axial with the bowl axis and moving to and fro, i.e. push-type centrifuges
- 3/04 . discharging solid particles from the bowl by a conveying screw co-axial with the bowl axis and rotating relatively to the bowl
- 3/06 . discharging solid particles by vibrating the bowl
- 3/08 . discharging solid particles by bowl walls in the form of endless bands

#### **5/00 Other centrifuges**

- 5/02 . Centrifuges consisting of a plurality of separate bowls rotating round an axis situated between the bowls
- 5/04 . Radial chamber apparatus for separating predominantly liquid mixtures, e.g. butyrometers
- 5/06 . Centrifugal counter-current apparatus
- 5/08 . Centrifuges for separating predominantly gaseous mixtures

- 5/10 . Centrifuges combined with other apparatus, e.g. electrostatic separators; Sets or systems of several centrifuges (B04B 5/12 takes precedence; magnetic or electrostatic separators B03C) [2]
- 5/12 . Centrifuges in which rotors other than bowls generate centrifugal effects in stationary containers

### Elements; Accessories

#### **7/00 Elements of centrifuges** (drives B04B 9/00; feeding, charging, or discharging accessories or devices B04B 11/00)

- 7/02 . Casings; Lids (shock absorbers, vibration dampers F16F)
- 7/04 . . Casings facilitating discharge
- 7/06 . . Safety devices
- 7/08 . Rotary bowls (centrifugal casting machines B22D)
- 7/10 . . Bowls for shaping solids
- 7/12 . . Inserts, e.g. armouring plates
- 7/14 . . . for separating walls of conical shape
- 7/16 . . . Sieves or filters (filters in general B01D; sieves in general B07B)
- 7/18 . . formed or coated with sieving or filtering elements (filters in general B01D; sieves in general B07B)

#### **9/00 Drives specially designed for centrifuges; Arrangement or disposition of transmission gearing; Suspending or balancing rotary bowls**

- 9/02 . Electric motor drives
- 9/04 . . Direct drive
- 9/06 . Fluid drive
- 9/08 . Arrangement or disposition of transmission gearing
- 9/10 . Control of the drive; Speed regulating
- 9/12 . Suspending rotary bowls
- 9/14 . Balancing rotary bowls (balancing in general G01M)

#### **11/00 Feeding, charging, or discharging bowls** (B04B 1/00, B04B 3/00, B04B 7/04 take precedence)

- 11/02 . Continuous feeding or discharging; Control arrangements therefor
- 11/04 . Periodical feeding or discharging; Control arrangements therefor
- 11/05 . . Base discharge
- 11/06 . Arrangement of distributors or collectors in centrifuges
- 11/08 . Skimmers or scrapers for discharging

13/00	<b>Control arrangements specially designed for centrifuges; Programme control of centrifuges</b> (control arrangements for feed, charge, or discharge B04B 11/00)	15/04	. for suppressing the formation of foam
		15/06	. for cleaning bowls, filters, sieves, inserts, or the like
		15/08	. for ventilating or producing a vacuum in the centrifuge
15/00	<b>Other accessories for centrifuges</b>	15/10	. for forming a filtering layer in the rotary bowl
15/02	. for cooling, heating, or heat insulating	15/12	. for drying or washing the separated solid particles

**B04C** **APPARATUS USING FREE VORTEX FLOW, E.G. CYCLONES** (jet mills B02C 19/06; exhaust or silencing apparatus for machines or engines having means for removing solid constituents of exhaust, using inertial or centrifugal separators F01N 3/037; cyclonic type combustion apparatus F23)

#### Note

This subclass covers apparatus for separating, mixing or like treating in which centrifugal effects are generated by free vortex flow, otherwise than by rotary bowls, rotors or curved passages.

1/00	<b>Apparatus in which the main direction of flow follows a flat spiral</b>	5/14	. Construction of the underflow ducting; Apex constructions; Discharge arrangements
3/00	<b>Apparatus in which the axial direction of the vortex remains unchanged</b>	5/15	. . with swinging flaps or revolving sluices; Sluices; Check-valves
3/02	. with heating or cooling, e.g. quenching, means	5/16	. . with variable-size outlets from the underflow ducting
3/04	. Multiple arrangement thereof	5/18	. . with auxiliary fluid assisting discharge
3/06	. Construction of inlets or outlets to the vortex chamber	5/181	. . Bulkheads or central bodies in the discharge opening
5/00	<b>Apparatus in which the axial direction of the vortex is reversed</b>	5/185	. . Dust collectors
5/02	. Construction of inlets by which the vortex flow is generated (fluid dynamics in general F15D)	5/187	. . . forming an integral part of the vortex chamber
5/04	. . Tangential inlets	5/20	. with heating or cooling, e.g. quenching, means
5/06	. . Axial inlets	5/22	. with cleaning means
5/08	. Vortex chamber constructions	5/23	. . using liquids
5/081	. . Shapes or dimensions	5/24	. Multiple arrangement thereof
5/085	. . with wear-resisting arrangements	5/26	. . for series flow
5/087	. . with flexible gas-tight walls	5/28	. . for parallel flow
5/10	. . with perforated walls	5/30	. . Recirculation constructions in or with cyclones which accomplish a partial recirculation of the medium, e.g. by means of conduits
5/103	. . Bodies or members, e.g. bulkheads, guides, in the vortex chamber (cores B04C 5/107)	7/00	<b>Apparatus not provided for in group B04C 1/00, B04C 3/00 or B04C 5/00; Multiple arrangements not provided for in one of the groups B04C 1/00, B04C 3/00, or B04C 5/00; Combinations of apparatus covered by two or more of the groups B04C 1/00, B04C 3/00, or B04C 5/00</b>
5/107	. . Cores; Devices for inducing an air-core in hydrocyclones (forming part of the outlet pipe B04C 5/13)	9/00	<b>Combinations with other devices, e.g. fans</b> (with filters B01D 50/00)
5/12	. Construction of the overflow ducting, e.g. diffusing or spiral exits	11/00	<b>Accessories, e.g. safety or control devices, not otherwise provided for</b> (with electrostatic precipitating arrangements B03C 3/14)
5/13	. . formed as a vortex finder and extending into the vortex chamber; Discharge from vortex finder otherwise than at the top of the cyclone; Devices for controlling the overflow		