

## SECTION B — PERFORMING OPERATIONS; TRANSPORTING

### B22 CASTING; POWDER METALLURGY

**B22D CASTING OF METALS; CASTING OF OTHER SUBSTANCES BY THE SAME PROCESSES OR DEVICES** (shaping of plastics or substances in a plastic state B29C; metallurgical processing, selection of substances to be added to metal C21, C22)

#### Note(s)

In this subclass, any material to be cast is referred to as metal.

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**1/00 Treatment of fused masses in the ladle or the supply runners before casting** (features relating to gas injection, provided on closures of the sliding-gate type B22D 41/42, provided on pouring-nozzles B22D 41/58)

**2/00 Arrangement of indicating or measuring devices, e.g. for temperature or viscosity of the fused mass [3]**

#### Casting of pigs, i.e. metal castings suitable for subsequent melting; Similar casting

**3/00 Pig or like casting** (equipment for conveying molten metal B22D 35/00)

3/02 • Moulding of beds

**5/00 Machines or plants for pig or like casting**

5/02 • with rotary casting tables

5/04 • with endless casting conveyers

#### Casting of ingots, i.e. metal castings suitable for subsequent rolling or forging

**7/00 Casting ingots** (equipment for conveying molten metal B22D 35/00)

7/02 • Casting compound ingots of two or more different metals in the molten state, i.e. integrally cast

7/04 • Casting hollow ingots

7/06 • Ingot moulds or their manufacture

7/08 • • Divided ingot moulds

7/10 • • Hot tops therefor

7/12 • Accessories, e.g. for sintering, for preventing splashing

**9/00 Machines or plants for casting ingots**

**Particular casting processes; Machines or apparatus therefor****11/00 Continuous casting of metals, i.e. casting in indefinite lengths** (metal drawing, metal extruding B21C)

- 11/01 • without moulds, e.g. on molten surfaces [2]
- 11/04 • into open-ended moulds (B22D 11/06, B22D 11/07 take precedence; plants for continuous casting, e.g. for upwardly drawing the strand, B22D 11/14) [3]
- 11/041 • • for vertical casting (B22D 11/043, B22D 11/049-B22D 11/059 take precedence) [7]
- 11/043 • • Curved moulds (B22D 11/049-B22D 11/059 take precedence) [7]
- 11/045 • • for horizontal casting (B22D 11/049-B22D 11/059 take precedence) [7]
- 11/047 • • • Means for joining tundish to mould [7]
- 11/049 • • for direct chill casting, e.g. electromagnetic casting [7]
- 11/05 • • into moulds having adjustable walls [7]
- 11/051 • • into moulds having oscillating walls [7]
- 11/053 • • Means for oscillating the moulds [7]
- 11/055 • • Cooling the moulds [7]
- 11/057 • • Manufacturing or calibrating the moulds [7]
- 11/059 • • Mould materials or platings [7]
- 11/06 • into moulds with travelling walls, e.g. with rolls, plates, belts, caterpillars (B22D 11/07 takes precedence) [3]
- 11/07 • Lubricating the moulds [3]
- 11/08 • Accessories for starting the casting procedure
- 11/10 • Supplying or treating molten metal (B22D 41/00 takes precedence) [1, 7]
- 11/103 • • Distributing the molten metal, e.g. using runners, floats, distributors [7]
- 11/106 • • Shielding the molten jet [7]
- 11/108 • • Feeding additives, powders, or the like [7]
- 11/11 • • Treating the molten metal [7]
- 11/111 • • • by using protecting powders [7]
- 11/112 • • • by accelerated cooling [7]
- 11/113 • • • by vacuum treating [7]
- 11/114 • • • by using agitating or vibrating means (B22D 11/117 takes precedence) [7]
- 11/115 • • • • by using magnetic fields [7]
- 11/116 • • • Refining the metal [7]
- 11/117 • • • • by treating with gases (B22D 11/118, B22D 11/119 take precedence) [7]
- 11/118 • • • • by circulating the metal under, over or around weirs (B22D 11/119 takes precedence) [7]
- 11/119 • • • • by filtering [7]
- 11/12 • Accessories for subsequent treating or working cast stock *in situ* (rolling immediately subsequent to continuous casting B21B 1/46, B21B 13/22) [3]
- 11/124 • • for cooling [2]
- 11/126 • • for cutting [2]
- 11/128 • • for removing [2]
- 11/14 • Plants for continuous casting, e.g. for upwardly drawing the strand
- 11/16 • Controlling or regulating processes or operations [2]
- 11/18 • • for pouring (B22D 11/20 takes precedence) [4]
- 11/20 • • for removing cast stock [4]
- 11/22 • • for cooling cast stock or mould [4]

**13/00 Centrifugal casting; Casting by using centrifugal force**

- 13/02 • of elongated solid or hollow bodies, e.g. pipes, in moulds rotating around their longitudinal axis

- 13/04 • of shallow solid or hollow bodies, e.g. wheels or rings, in moulds rotating around their axis of symmetry
- 13/06 • of solid or hollow bodies in moulds rotating around an axis arranged outside of the mould
- 13/08 • in which a stationary mould is fed from a rotating mass of liquid metal
- 13/10 • Accessories for centrifugal casting apparatus, e.g. moulds, linings therefor, means for feeding molten metal, cleansing moulds, removing castings (making or lining moulds B22C)
- 13/12 • Controlling, supervising, specially adapted to centrifugal casting, e.g. for safety reasons [3]

**15/00 Casting using a mould or core of which a part significant to the process of high thermal conductivity, e.g. chill casting; Moulds or accessories specially adapted therefor** (continuous casting of metals into open-ended moulds for direct chill casting B22D 11/049) [1, 7]

- 15/02 • of cylinders, pistons, bearing shells or like thin-walled objects
- 15/04 • Machines or apparatus for chill casting (B22D 15/02 takes precedence)

**17/00 Pressure die casting or injection die casting, i.e. casting in which the metal is forced into a mould under high pressure** [3]

- 17/02 • Hot chamber machines, i.e. with heated press chamber in which metal is melted
- 17/04 • • Plunger machines
- 17/06 • • Air injection machines
- 17/08 • Cold chamber machines, i.e. with unheated press chamber into which molten metal is ladled
- 17/10 • • with horizontal press motion
- 17/12 • • with vertical press motion
- 17/14 • Machines with evacuated die cavity
- 17/16 • specially adapted for casting slide fasteners or elements therefor
- 17/18 • Machines built up from units providing for different combinations
- 17/20 • Accessories; Details
- 17/22 • • Dies (manufacture, *see* the appropriate class, e.g. B23P 15/24); Die plates; Die supports; Cooling equipment for dies; Accessories for loosening and ejecting castings from dies
- 17/24 • • • Accessories for locating and holding cores or inserts
- 17/26 • • Mechanisms or devices for locking or opening dies
- 17/28 • • Melting pots
- 17/30 • • Accessories for supplying molten metal, e.g. in rations
- 17/32 • • Controlling equipment

**18/00 Pressure casting; Vacuum casting** (B22D 17/00 takes precedence; treating the metal in the mould by using pressure or vacuum B22D 27/00) [3]

- 18/02 • Pressure casting making use of mechanical pressing devices, e.g. cast-forging (B22D 18/04 takes precedence) [3]
- 18/04 • Low pressure casting, i.e. making use of pressures up to a few bars to fill the mould [3]
- 18/06 • Vacuum casting, i.e. making use of vacuum to fill the mould [3]
- 18/08 • Controlling, supervising, e.g. for safety reasons [3]

<p><b>19/00</b></p> <p>19/02</p> <p>19/04</p> <p>19/06</p> <p>19/08</p> <p>19/10</p> <p>19/12</p> <p>19/14</p> <p>19/16</p>  <p><b>21/00</b></p> <p>21/02</p> <p>21/04</p> <p>21/06</p>  <p><b>23/00</b></p> <p>23/02</p> <p>23/04</p> <p>23/06</p> <p>23/10</p> <p><b>25/00</b></p> <p>25/02</p> <p>25/04</p> <p>25/06</p> <p>25/08</p> <p><b>27/00</b></p> <p>27/02</p> <p>27/04</p> <p>27/06</p>	<p><b>Casting in, on, or around, objects which form part of the product</b> (B22D 23/04 takes precedence; aluminothermic welding B23K 23/00; coating by casting molten material on the substrate C23C 6/00)</p> <ul style="list-style-type: none"> <li>• for making reinforced articles (B22D 19/14 takes precedence) [3]</li> <li>• for joining parts</li> <li>• for manufacturing or repairing tools</li> <li>• for building up linings or coverings, e.g. of anti-frictional metal</li> <li>• Repairing defective or damaged objects by metal casting techniques (by other techniques B23P 6/04)</li> <li>• for making objects, e.g. hinges, with parts which are movable relatively to one another</li> <li>• the objects being filamentary or particulate in form (making alloys containing fibres or filaments by contacting the fibres or filaments with molten metal C22C 47/08) [3]</li> <li>• for making compound objects cast of two or more different metals, e.g. for making rolls for rolling mills (casting compound ingots B22D 7/02) [3]</li> </ul> <p><b>Casting non-ferrous metals or metallic compounds so far as their metallurgical properties are of importance for the casting procedure</b> (apparatus for vacuum casting B22D 18/00); <b>Selection of compositions therefor</b></p> <ul style="list-style-type: none"> <li>• Casting exceedingly oxidisable non-ferrous metals, e.g. in inert atmosphere (use of inert atmosphere in casting metals in general B22D 23/00)</li> <li>• • Casting aluminium or magnesium</li> <li>• Casting non-ferrous metals with a high melting-point, e.g. metallic carbides (B22D 21/02 takes precedence)</li> </ul> <p><b>Casting processes not provided for in groups B22D 1/00-B22D 21/00</b> (making metallic powder by casting B22F 9/08; aluminothermic welding B23K 23/00; remelting metals C22B 9/16)</p> <ul style="list-style-type: none"> <li>• Top casting</li> <li>• Casting by dipping (hot-dipping or immersion processes for applying coating material in the molten state without affecting the shape C23C 2/00)</li> <li>• Melting-down metal, e.g. metal particles, in the mould</li> <li>• • Electroslag casting [5]</li> </ul> <p><b>Special casting characterised by the nature of the product</b> (B22D 15/02, B22D 17/16, B22D 19/00 take precedence; casting stereotype plates B41D 3/00) [2]</p> <ul style="list-style-type: none"> <li>• by its peculiarity of shape; of works of art</li> <li>• • Casting metal electric battery plates or the like (manufacture thereof by multi-step processes H01M 4/82) [2]</li> <li>• by its physical properties (B22D 27/00 takes precedence)</li> <li>• • by uniform hardness (B22D 15/00 takes precedence)</li> </ul> <p><b>Treating the metal in the mould while it is molten or ductile</b> (B22D 7/12, B22D 11/10, B22D 18/00, B22D 43/00 take precedence) [3]</p> <ul style="list-style-type: none"> <li>• Use of electric or magnetic effects</li> <li>• Influencing the temperature of the metal, e.g. by heating or cooling the mould (cooling of open-ended moulds in continuous casting B22D 11/055) [1, 7]</li> <li>• • Heating the top discard of ingots (hot tops for ingot moulds B22D 7/10)</li> </ul>	<p>27/08</p> <p>27/09</p> <p>27/11</p> <p>27/13</p> <p>27/15</p> <p>27/18</p> <p>27/20</p>  <p><b>Final measures after casting</b></p> <p><b>29/00</b></p> <p>29/02</p> <p>29/04</p> <p>29/06</p> <p>29/08</p> <p><b>30/00</b></p>  <p><b>31/00</b></p>  <p><b>Other equipment for casting [3]</b></p> <p><b>33/00</b></p> <p>33/02</p> <p>33/04</p> <p>33/06</p> <p><b>35/00</b></p> <p>35/02</p> <p>35/04</p> <p>35/06</p> <p><b>37/00</b></p>  <p><b>39/00</b></p> <p>39/02</p> <p>39/04</p> <p>39/06</p>	<ul style="list-style-type: none"> <li>• Shaking, vibrating, or turning of moulds (B22D 11/051, B22D 11/053 take precedence) [1, 7]</li> <li>• by using pressure [3]             <ul style="list-style-type: none"> <li>• • making use of mechanical pressing devices [3]</li> <li>• • making use of gas pressure [3]</li> </ul> </li> <li>• by using vacuum [3]</li> <li>• Measures for using chemical processes for influencing the surface composition of castings, e.g. for increasing resistance to acid attack</li> <li>• Measures not previously mentioned for influencing the grain structure or texture; Selection of compositions therefor</li> </ul> <p><b>Removing castings from moulds, not restricted to casting processes covered by a single main group; Removing cores; Handling ingots [2]</b></p> <ul style="list-style-type: none"> <li>• Vibratory apparatus specially designed for shaking out flasks</li> <li>• Handling or stripping castings or ingots (grippers in general, see the relevant subclasses, e.g. B66C)             <ul style="list-style-type: none"> <li>• • Strippers actuated by fluid pressure</li> <li>• • Strippers actuated mechanically [2]</li> </ul> </li> </ul> <p><b>Cooling castings, not restricted to casting processes covered by a single main group</b> (accessories for cooling cast stock in continuous casting of metals B22D 11/124; controlling or regulating processes or operations for cooling cast stock or mould in continuous casting of metals B22D 11/22; chill casting B22D 15/00) [5]</p> <p><b>Cutting-off surplus material after casting, e.g. gates</b> (cleaning of castings by sand-blasting B24C)</p> <p><b>Equipment for handling moulds</b></p> <ul style="list-style-type: none"> <li>• Turning or transposing moulds</li> <li>• Bringing together or separating moulds</li> <li>• Burdening or relieving moulds</li> </ul> <p><b>Equipment for conveying molten metal into beds or moulds</b> (B22D 37/00-B22D 41/00 take precedence; specially adapted to particular processes or machines, see the relevant groups)</p> <ul style="list-style-type: none"> <li>• into beds</li> <li>• into moulds, e.g. base plates, runners</li> <li>• Heating or cooling equipment</li> </ul> <p><b>Controlling or regulating the pouring of molten metal from a casting melt-holding vessel</b> (B22D 39/00, B22D 41/00 take precedence; specially adapted to particular processes or machines, see the relevant groups of this subclass) [3, 5]</p> <p><b>Equipment for supplying molten metal in rations</b> (specially adapted to particular processes or machines, see the relevant groups of this subclass)</p> <ul style="list-style-type: none"> <li>• having means for controlling the amount of molten metal by volume [3]</li> <li>• having means for controlling the amount of molten metal by weight [3]</li> <li>• having means for controlling the amount of molten metal by controlling the pressure above the molten metal [3]</li> </ul>
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## B22D

- 41/00 Casting melt-holding vessels, e.g. ladles, tundishes, cups or the like** (B22D 39/00, B22D 43/00 take precedence) [5]
- 41/005 • with heating or cooling means [5]
  - 41/01 • • Heating means [5]
  - 41/015 • • • with external heating, i.e. the heat source not being a part of the ladle [5]
  - 41/02 • Linings
  - 41/04 • tiltable
  - 41/05 • • Tea-pot spout ladles [5]
  - 41/06 • Equipment for tilting
  - 41/08 • for bottom pouring (B22D 41/14, B22D 41/50 take precedence)
  - 41/12 • Travelling ladles or similar containers; Cars for ladles (casting cranes B66C)
  - 41/13 • • Ladle turrets [7]
  - 41/14 • Closures [5]
  - 41/16 • • stopper-rod type, i.e. a stopper-rod being positioned downwardly through the vessel and the metal therein, for selective registry with the pouring opening [5]
  - 41/18 • • • Stopper-rods therefor [5]
  - 41/20 • • • Stopper-rod operating equipment [5]
  - 41/22 • • sliding-gate type, i.e. having a fixed plate and a movable plate in sliding contact with each other for selective registry of their openings [5]
  - 41/24 • • • characterised by a rectilinearly movable plate (B22D 41/38-B22D 41/42 take precedence) [5]
  - 41/26 • • • characterised by a rotatively movable plate (B22D 41/38-B22D 41/42 take precedence) [5]
  - 41/28 • • • Plates therefor (B22D 41/38-B22D 41/42 take precedence) [5]
  - 41/30 • • • • Manufacturing or repairing thereof [5]

- 41/32 • • • • characterised by the materials used therefor [5]
  - 41/34 • • • • Supporting, fixing or centering means therefor [5]
  - 41/36 • • • • Treating the plates, e.g. lubricating, heating (ladles, cups or the like with heating means B22D 41/01) [5]
  - 41/38 • • • Means for operating the sliding gate [5]
  - 41/40 • • • Means for pressing the plates together [5]
  - 41/42 • • • Features relating to gas injection [5]
  - 41/44 • • Consumable closure means, i.e. closure means being used only once [5]
  - 41/46 • • • Refractory plugging masses [5]
  - 41/48 • • • Melttable closures [5]
  - 41/50 • Pouring-nozzles [5]
  - 41/52 • • Manufacturing or repairing thereof [5]
  - 41/54 • • • characterised by the materials used therefor [5]
  - 41/56 • • Means for supporting, manipulating or changing a pouring-nozzle [5]
  - 41/58 • • with gas injecting means [5]
  - 41/60 • • with heating or cooling means [5]
  - 41/62 • • with stirring or vibrating means [5]
- 43/00 Mechanical cleaning, e.g. skimming of molten metals**
- 45/00 Equipment for casting, not otherwise provided for**
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- 46/00 Controlling, supervising, not restricted to casting covered by a single main group, e.g. for safety reasons [3]**
- 47/00 Casting plants**
- 47/02 • for both moulding and casting