

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)

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

PRELIMINARY TREATMENTS.....	1/00	Casting for other specified purposes.....	25/00
INDICATING OR MEASURING	2/00	CASTING PARTICULAR METALS	21/00
GENERAL CASTING PROCESSES; EQUIPMENT THEREFOR		AFTER-TREATMENTS	
Centrifugal casting.....	13/00	Of non-solidified metal	27/00
Pressure die casting or injection die casting	17/00	Removing from moulds	29/00
Pressure casting, vacuum casting	18/00	Cooling	30/00
Other processes	15/00, 23/00	Cutting-off surplus material	31/00
CASTING CHARACTERISED BY THE PRODUCTS		OTHER EQUIPMENT	
Pig casting.....	3/00, 5/00	For handling, for supplying.....	29/00, 33/00, 35/00, 37/00, 39/00, 41/00
Ingot casting.....	7/00, 9/00	For cleaning.....	43/00
Continuous casting	11/00	For other purposes.....	45/00
Casting in, on, or around objects.....	19/00	CONTROLLING OR SUPERVISING	46/00
		CASTING PLANTS.....	47/00

- 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]
- 19/00 Casting in, on, or around, objects which form part of the product** (B22D 23/04 takes precedence; aluminothermic welding B23K 23/00; coating by casting molten material on the substrate C23C 6/00)
- 19/02 . . for making reinforced articles (B22D 19/14 takes precedence) [3]
- 19/04 . . for joining parts
- 19/06 . . for manufacturing or repairing tools
- 19/08 . . for building up linings or coverings, e.g. of anti-frictional metal
- 19/10 . . Repairing defective or damaged objects by metal casting techniques (by other techniques B23P 6/04)
- 19/12 . . for making objects, e.g. hinges, with parts which are movable relatively to one another
- 19/14 . . 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]
- 19/16 . . 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]
- 21/00 Casting non-ferrous metals or metallic compounds so far as their metallurgical properties are of importance for the casting procedure** (apparatus for vacuum casting B22D 18/00); **Selection of compositions therefor**
- 21/02 . . Casting exceedingly oxidisable non-ferrous metals, e.g. in inert atmosphere (use of inert atmosphere in casting metals in general B22D 23/00)
- 21/04 . . . Casting aluminium or magnesium
- 21/06 . . Casting non-ferrous metals with a high melting-point, e.g. metallic carbides (B22D 21/02 takes precedence)

- 23/00 Casting processes not provided for in groups B22D 1/00 B22D 21/00** (making metallic powder by casting B22F 9/08; alumino-thermic welding B23K 23/00; remelting metals C22B 9/16)
- 23/02 . Top casting
 - 23/04 . Casting by dipping (hot-dipping or immersion processes for applying coating material in the molten state without affecting the shape C23C 2/00)
 - 23/06 . Melting-down metal, e.g. metal particles, in the mould
 - 23/10 . . Electroslag casting [5]
- 25/00 Special casting characterised by the nature of the product** (B22D 15/02, B22D 17/16, B22D 19/00 take precedence; casting stereotype plates B41D 3/00) [2]
- 25/02 . by its peculiarity of shape; of works of art
 - 25/04 . . Casting metal electric battery plates or the like (manufacture thereof by multi-step processes H01M 4/82) [2]
 - 25/06 . by its physical properties (B22D 27/00 takes precedence)
 - 25/08 . . by uniform hardness (B22D 15/00 takes precedence)
- 27/00 Treating the metal in the mould while it is molten or ductile** (B22D 7/12, B22D 11/10, B22D 18/00, B22D 43/00 take precedence) [3]
- 27/02 . Use of electric or magnetic effects
 - 27/04 . 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]
 - 27/06 . . Heating the top discard of ingots (hot tops for ingot moulds B22D 7/10)
 - 27/08 . Shaking, vibrating, or turning of moulds (B22D 11/051, B22D 11/053 take precedence) [1,7]
 - 27/09 . by using pressure [3]
 - 27/11 . . making use of mechanical pressing devices [3]
 - 27/13 . . making use of gas pressure [3]
 - 27/15 . by using vacuum [3]
 - 27/18 . Measures for using chemical processes for influencing the surface composition of castings, e.g. for increasing resistance to acid attack
 - 27/20 . Measures not previously mentioned for influencing the grain structure or texture; Selection of compositions therefor

Final measures after casting (cleaning of castings by sand-blasting B24C)

- 29/00 Removing castings from moulds, not restricted to casting processes covered by a single main group; Removing cores; Handling ingots** [2]
- 29/02 . Vibratory apparatus specially designed for shaking out flasks
 - 29/04 . Handling or stripping castings or ingots (grippers in general, see the relevant subclasses, e.g. B66C)
 - 29/06 . . Strippers actuated by fluid pressure
 - 29/08 . . Strippers actuated mechanically [2]
- 30/00 Cooling castings, not restricted to casting processes covered by a single main group** (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]
- 31/00 Cutting-off surplus material, e.g. gates**

Other equipment for casting (arrangement of indicating or measuring devices B22D 2/00) [3]

- 33/00 Equipment for handling moulds**
- 33/02 . Turning or transposing moulds
 - 33/04 . Bringing together or separating moulds
 - 33/06 . Burdening or relieving moulds
- 35/00 Equipment for conveying molten metal into beds or moulds** (B22D 37/00 B22D 41/00 take precedence; specially adapted to particular processes or machines, see the relevant groups)
- 35/02 . into beds
 - 35/04 . into moulds, e.g. base plates, runners
 - 35/06 . Heating or cooling equipment
- 37/00 Controlling or regulating the pouring of molten metal from a casting melt-holding vessel** (B22D 39/00, B22D 41/00 take precedence; specially adapted to particular processes or machines, see the relevant groups of this subclass) [3,5]
- 39/00 Equipment for supplying molten metal in rations** (specially adapted to particular processes or machines, see the relevant groups of this subclass)
- 39/02 . having means for controlling the amount of molten metal by volume [3]
 - 39/04 . having means for controlling the amount of molten metal by weight [3]
 - 39/06 . having means for controlling the amount of molten metal by controlling the pressure above the molten metal [3]
- 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]

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- 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 Meltable 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