

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](#))

Definition statement

This place covers:

The casting of metals and of other substances by the same processes or machines. By "other substances" is meant basically the group of non-metals, e.g. silicon.

References

Limiting references

This place does not cover:

Shaping of plastics	B29C
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Processing of pig iron, e.g. refining, manufacture of wrought iron or steel	C21C
Alloys	C22C

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Core	Part of a mould used in a casting process that forms the internal shapes of a casting, which cannot be shaped by the pattern
Gate	Channel that allow the molten metal to enter the mould cavity during casting

B22D 1/00

Treatment of fused masses in the ladle or the supply runners before casting **{{for continuous casting [B22D 11/10](#); metallurgical processing, e.g. refining of iron or other metal [C21](#), [C22](#), [C25C](#)}}**

Definition statement

This place covers:

Treatment on reduced scale of the molten metal , whether in the ladle or in the supply runners.

References

Limiting references

This place does not cover:

Treating molten metal (during continuous casting)	B22D 11/10
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Metallurgical processing of metals	C21B , C21C , C22B
Refining of metals by electrolysis of melts	C25C

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Runner	Portion of the gate assembly that connects the sprue with the gate
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B22D 2/00

Arrangement of indicating or measuring devices, e.g. for temperature or viscosity of the fused mass

Definition statement

This place covers:

Measuring devices for process parameters during casting, e.g. temperature or viscosity of the fused mass, thickness of a frozen shell.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring liquid level in general	G01F 23/00
Measuring temperature in general	G01K
Measuring viscosity	G01N 11/00

Special rules of classification

If the measurement is part of a regulating process, then classification is also given in the relevant groups (e.g. [B22D 11/16](#) - [B22D 11/225](#)).

B22D 3/00

Pig or like casting (equipment for conveying molten metal [B22D 35/00](#))

Definition statement

This place covers:

Methods, machines or plants for casting pigs.

References

Limiting references

This place does not cover:

Casting of ingots	B22D 7/00 , B22D 9/00
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Special rules of classification

Equipment for conveying molten metal to the pig moulds is classified in [B22D 35/00](#) - [B22D 35/06](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Pig	A metal casting, produced in a mould provided that it is intended for remelting before use
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B22D 5/00

Machines or plants for pig or like casting

Definition statement

This place covers:

Machines or plants for pig casting, e.g. devices for stacking pigs, rotary casting tables.

B22D 7/00

Casting ingots, {e.g. from ferrous metals} (equipment for conveying molten metal [B22D 35/00](#))

Definition statement

This place covers:

Casting processes, machines or plants for casting of ingots in definite lengths.

References

Limiting references

This place does not cover:

Casting of pigs	B22D 3/00 - B22D 5/04
Continuous casting of ingots	B22D 11/00 - B22D 11/225

Special rules of classification

Equipment for conveying molten metal to the ingot moulds is classified in [B22D 35/00](#) - [B22D 35/06](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Ingot	A metal casting, produced in a mould for subsequently rolling or forging
hot top	Insulating cover placed in the upper region of an ingot mould to reduce heat loss of the solidifying metal, resulting in a longer solidification time whereby the shrinkage cavity is located higher in the ingot

B22D 9/00

Machines or plants for casting ingots

Definition statement

This place covers:

Machines or plants for top or bottom casting.

B22D 11/00

Continuous casting of metals, i.e. casting in indefinite lengths (metal drawing, metal extruding [B21C](#))

Definition statement

This place covers:

Methods and machines for casting metals in indefinite lengths.

[B22D 11/0401](#) covers moulds provided at their top with a refractory heat insulating reservoir for feeding the mould.

[B22D 11/0475](#) covers continuous casting processes wherein a ceramic ring is mounted between a molten metal holding vessel and the continuous casting mould, in order to provide a steady supply of liquid metal to the mould.

[B22D 11/049](#) covers continuous metal casting where the cooling water flows from the underside of the mold cooling chamber and sprays directly on the ingot surface, thereby completing the solidification process.

[B22D 11/1206](#) covers methods and machines for applying a light rolling reduction on a strand which is not completely solidified.

[B22D 11/122](#) covers methods and machines for creating a magnetic field around a solidifying cast strand, emerged from the mould, in order to stir the molten core of the strand to obtain a homogeneous structure.

References

Limiting references

This place does not cover:

Casting of ingots in definite lengths Metal drawing, metal extruding	B22D 7/00 - B22D 9/006 , B21C
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Lubricating injection die casting moulds	B22D 17/2007
Rolling of metals	B21B
Rolls; Lubricating or cooling rolls while in use (rolling metals)	B21B 27/00
Rollers for roller conveyors (rolling metals)	B21B 39/008
Construction of glass rollers	C03B 13/16
Construction of the conveyor rolls (for glass)	C03B 35/18

Rolls; Roll arrangements (in furnaces)	C21D 9/0012
Rolls; Drums; Roll arrangements (in continuous furnaces)	C21D 9/563
...with cooling	C21D 9/5737
...the conveyor being constituted by rollers	F27B 9/2407
Transport or conveyor rolls for furnaces	F27D 3/026

Special rules of classification

The composition of the specific alloys ([B22D 11/001](#) - [B22D 11/004](#)) is also classified in [C22C](#) (alloys).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Starter bar	A bar which plugs a mould opening at the start of the casting procedure, and which is gradually withdrawn from the mould, as the molten metal solidifies, in order to remove the cast ingot from the mould
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B22D 13/00

Centrifugal casting; Casting by using centrifugal force

Definition statement

This place covers:

Centrifugal casting or casting by using a centrifugal force to produce shallow bodies or elongated bodies in definite lengths; the necessary accessory devices, processes and machines.

References

Limiting references

This place does not cover:

Continuous rotative casting	B22D 11/144 , B22D 11/0405
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Casting jewelry articles	B22D 25/026
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Special rules of classification

The accessories for the centrifugal casting apparatus (like moulds, linings, means for feeding molten metal, removing castings) are classified in [B22D 13/10](#) - [B22D 13/108](#); if it is clearly from the description that they could also be used for other particular casting processes then they are also classified in those relevant groups.

B22D 15/00

Casting using a mould or core of which a part significant to the process is of high thermal conductivity, e.g. chill casting; Moulds or accessories specially adapted therefor

Definition statement

This place covers:

Casting using a mould or core with an insert of high thermal conductivity, to locally increase the rate of heat removal during solidification of the molten metal and thereby define the structure of the casting.

References

Limiting references

This place does not cover:

Continuous casting into open-ended moulds for direct chill casting	B22D 11/049
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B22D 17/00

Pressure die casting or injection die casting, i.e. casting in which the metal is forced into a mould under high pressure

Definition statement

This place covers:

Casting in an injection casting mould, whereby the molten metal is injected into the mould under high pressure; the necessary accessory devices, processes and machines.

[B22D 17/002](#) covers moulds which are moving outside the normal working position during each moulding cycle

[B22D 17/005](#) covers moulds wherein two or more fixed mould parts are cooperating each with a moveable counterpart ; see WO238311-fig.1

[B22D 17/007](#) covers a method wherein the injected metal is in a semi solid state

[B22D 17/04](#) covers machines wherein the metal which is melted in a heated press chamber, is moved from this press chamber to the mould cavity by means of a plunger

[B22D 17/06](#) covers machines wherein the metal which is melted in a heated press chamber, is moved from this press chamber to the mould cavity by means of air pressure

[B22D 17/30](#) covers accessories for supplying the molten metal to the shot sleeve.

Relationships with other classification places

Methods and machines for injection moulding of plastics are classified in [B29C](#).

If it is clearly stated in a document that the content also applies to injection die casting metals, then a class is also given in [B22D 17/00](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Equipment for supplying molten metal in rations	B22D 39/00 - B22D 39/06
Compositions for coating moulds	B22C 3/00
Accessories for reinforcing or securing moulding materials or cores	B22C 21/14

Special rules of classification

All documents concerning mechanisms or devices for opening, closing or clamping pressure die casting moulds for casting metals, are also classified in the relevant groups [B29C 45/64](#) - [B29C 45/68](#).

[B22D 17/2007](#) covers methods and apparatus for lubricating moulds.

If a composition is also included, then in addition a [B22C 3/00](#) class is also given.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

S hot sleeve	Reservoir, containing the necessary amount of molten metal to make a casting, and from where this molten metal is pressed into the mould
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B22D 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](#))

Definition statement

This place covers:

Casting whereby a low pressure or a vacuum is used to pressurize the molten metal; the necessary machines, processes and controlling.

[B22D 18/02](#) covers processes and machines wherein an amount of liquid metal, required for one casting part, being introduced in the cavity of a lower mould and thereafter a convex portion of an upper mould being advanced in the cavity filled with molten metal, which metal undergoes a compression during this forging step.

References

Limiting references

This place does not cover:

Injection die casting	B22D 17/00 - B22D 17/32
Aftertreating by using pressure on the metal in the mould, while it is molten or ductile	B22D 27/09 - B22D 27/13
Aftertreating by using vacuum on the metal in the mould, while it is molten or ductile	B22D 27/15

Informative references

Attention is drawn to the following places, which may be of interest for search:

Forging	B21J
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B22D 19/00

Casting in, on, or around objects which form part of the product ([B22D 23/04](#) takes precedence; alumino-thermic welding [B23K 23/00](#); coating by casting molten material on the substrate [C23C 6/00](#))

Definition statement

This place covers:

Processes and devices whereby a casting is done on, in or around a body part, which forms afterwards an essential part of the product.

References**Limiting references**

This place does not cover:

Alumino-thermic welding	B23K 23/00
Coating by casting molten metal on a substrate	C23C 6/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Repairing fractures or cracked metal parts	B23P 6/04
Repairing rotor blades	F01D 5/005
Cylinder heads	F02F
Bearings	F16C

B22D 21/00

Casting non-ferrous metals or metallic compounds so far as their metallurgical properties are of importance for the casting procedure; Selection of compositions therefor {(non-ferrous ingots [B22D 7/005](#))}

Definition statement

This place covers:

Casting of products from non-ferrous metals wherein the metallurgical properties of the metal play an important role in the casting process.

References**Limiting references**

This place does not cover:

Casting ingots from non ferrous metals	B22D 7/005
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Special rules of classification

Casting aluminium or magnesium is not classified in [B22D 21/04](#) but in [B22D 21/007](#).

The corresponding compositions of the metallic compounds or alloys have also to be classified in [C22C](#).

B22D 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](#))

Definition statement

This place covers:

Casting processes not provided for in groups [B22D 1/00](#) - [B22D 21/00](#), for example:

[B22D 23/003](#) covers methods and devices for spraying molten metal on the surface of a pattern (or core); after solidification of the molten metal, the pattern (or core) is removed, leaving a cast piece.

[B22D 23/02](#) covers methods and devices where the molten metal is poured from the top into the mould

[B22D 23/04](#) covers methods and devices where

- a mould is filled by submerging in a molten metal pool

or

a core is immersed in a molten metal pool; after solidification of a predetermined layer of molten metal on the core surface, the core is removed, leaving a cast piece. [B22D 23/06](#) covers melting-down metal in the mould

References

Limiting references

This place does not cover:

Top casting ingots	B22D 9/003
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Making metallic powder by casting	B22F 9/08
Alumino-thermic welding	B23K 23/00
Remelting metals	C22B 9/16
Electroslag remelting	C22B 9/18

B22D 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](#))

Definition statement

This place covers:

Casting methods and apparatuses where the nature of the obtained product is characteristic; this nature could be a specific shape (like pieces of art, metal foams, jewelry) or a specific physical property (like uniform hardness).

References

Limiting references

This place does not cover:

Casting stereotype plates	B41D 3/00
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Alloys with open or closed pores	C22C 1/08
Protection against damping, acoustic waves	G10K 11/162 , G10K 11/165

Special rules of classification

Documents classified in these groups need also to be classified according to their casting process ([B22D 13/00](#) - [B22D 23/00](#)).

B22D 27/00

Treating the metal in the mould while it is molten or ductile ([B22D 7/12](#), [B22D 11/10](#), [B22D 43/00](#) take precedence); {Pressure or vacuum casting ([B22D 17/00](#) takes precedence)}

Definition statement

This place covers:

The treatment of the molten metal after its introduction in the mould and during its solidification.

References

Limiting references

This place does not cover:

Appurtenances for preventing splashing	B22D 7/12
Use of electric or magnetic effects in continuous casting	B22D 11/015 , B22D 11/115
Cooling open-ended moulds	B22D 11/055
Cooling moulds with travelling walls during continuous casting	B22D 11/068 - B22D 11/0691

Limiting references

Treating molten metal in the continuous casting mould	B22D 11/10
Secondary cooling in continuous casting	B22D 11/124 - B22D 11/1248
Controlling for cooling cast stock or mould in continuous casting	B22D 11/22 - B22D 11/225
Cooling moulds in centrifugal casting	B22D 13/105
Chill casting	B22D 15/00 - B22D 15/04
Casting processes and apparatuses using pressure to fill the mould	B22D 17/00 - B22D 17/32 , B22D 18/02 , B22D 18/04
Exerting after-pressure on the moulding material during injection die casting	B22D 17/2069
Cooling dies in pressure injection die casting	B22D 17/2218
Casting processes and apparatuses using vacuum to fill the mould	B22D 18/06
Skimming of molten metals	B22D 43/00
Casting of single crystals	C30B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Nodularising additive agents	C21C 1/105
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B22D 29/00

Removing castings from moulds, not restricted to casting processes covered by a single main group; Removing cores; Handling ingots ([B22D 13/10](#), [B22D 11/124](#), [B22D 17/00](#) take precedence)

Definition statement

This place covers:

The removing of castings and ingots from their moulds and the removing of cores from the cast pieces; the necessary processes, machines and accessory devices.

References**Limiting references**

This place does not cover:

Removing castings from centrifugal casting moulds	B22D 13/108
Evacuating cast pieces from injection die casting moulds	B22D 17/2084
Treating the metal in the mould by vibrating the mould	B22D 27/08

Informative references

Attention is drawn to the following places, which may be of interest for search:

Cranes	B66C
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Flask	A metal frame used for making and holding a refractory mould
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B22D 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](#))

Definition statement

This place covers:

Cooling of castings when removed totally or partly from the moulds and where the surface of the casting is totally or partly in direct contact with a cooling fluid.

References

Limiting references

This place does not cover:

Open-ended moulds for direct chill casting	B22D 11/049
Cooling open-ended moulds	B22D 11/055
Cooling moulds with travelling walls during continuous casting	B22D 11/068 - B22D 11/0691
Secondary cooling in continuous casting	B22D 11/124 - B22D 11/1248
Controlling for cooling cast stock or mould in continuous casting	B22D 11/22 - B22D 11/225
Cooling moulds in centrifugal casting	B22D 13/105
Chill casting	B22D 15/00 - B22D 15/04
Cooling dies in pressure injection die casting	B22D 17/2218
Influencing temperature of the metal	B22D 27/04 - B22D 27/045

B22D 31/00

Cutting-off surplus material, e.g. gates; {Cleaning and working on castings ([B22D 17/2076](#) takes precedence)}

Definition statement

This place covers:

The removing of the gating systems from the castings and the subsequently cleaning of the castings, the removal of any parts of the casting/gating system, e.g. removal of risers

References

Limiting references

This place does not cover:

Cutting off equipment for sprues or ingates combined with an injection die casting machine	B22D 17/2076
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Trimming	B21J
Shearing, sawing	B23D
Grinding or polishing	B24B

Special rules of classification

Specific constructions of machines for removing the gates from the casting or cleaning the casting are classified in the relevant groups ([B23D](#), [B24B](#)).

B22D 33/00

Equipment for handling moulds

Definition statement

This place covers:

Any equipment for handling moulds after their manufacture.

[B22D 33/005](#) covers the transport of sand moulds which have been taken out from their flask

[B22D 33/06](#) covers equipment for placing or removing weights on the cope and drag mould parts, to prevent shifting during casting.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Making flaskless moulds	B22C 11/10
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Cope	the top half of a horizontally parted mould
Drag	the bottom half of a horizontally parted mould
Flaskless mould	a mould which is made in a moulding machine wherein one or more flasks forming part of the machine and where after compacting the moulding material, the mould is removed from the flask(s) and set side by side on a conveyor

B22D 35/00

Equipment for conveying molten metal into beds or moulds ([B22D 37/00](#) - [B22D 41/00](#) take precedence)

Definition statement

This place covers:

Equipment for conveying molten metal into beds or moulds, in general; heating or cooling of the molten metal in an equipment for conveying the metal into moulds or beds.

Relationships with other classification places

Heating/cooling of moulds is classified in [B22C 9/065](#)

References

Limiting references

This place does not cover:

Feeding centrifugal casting moulds	B22D 13/107
Means for forcing molten metal into an injection die	B22D 17/2015 - B22D 17/2069
Supplying molten metal in pressure die casting	B22D 17/30
Supplying molten metal in ratios	B22D 39/00 - B22D 39/06
Pouring nozzles	B22D 41/50

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Bed	a moulding sand layer (mostly on ground level) wherein a multiple mould cluster has been made
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B22D 37/00

Controlling or regulating the pouring of molten metal from a casting melt-holding vessel ([B22D 11/18](#), [B22D 39/00](#), [B22D 41/00](#) take precedence)

Definition statement

This place covers:

The control and the shielding of the molten metal stream issuing from a vessel.

References

Limiting references

This place does not cover:

Controlling or regulating processes for pouring in continuous casting	B22D 11/18 - B22D 11/188
Supplying molten metal in ratios	B22D 39/00 - B22D 39/06
Closures in casting melt-holding vessels	B22D 41/14 - B22D 41/48

B22D 39/00

Equipment for supplying molten metal in rations

Definition statement

This place covers:

All kind of equipment making it possible to deliver the amount of molten metal, necessary to produce a casting.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Accessories for supplying molten metal in pressure die casting machines	B22D 17/30
Electrodynamic pumps	H02K 44/02

Special rules of classification

If the equipment is adapted for a particular casting machine ([B22D 13/00](#)-[B22D 25/00](#)) it is classified in the relevant group for that casting machine and in the relevant subgroup of [B22D 39/00](#) - [B22D 39/06](#).

B22D 41/00

Casting melt-holding vessels, e.g. ladles, tundishes, cups or the like ([B22D 39/00](#), [B22D 43/00](#) take precedence)

Definition statement

This place covers:

Casting vessels (ladles, tundishes or cups);

Their constructional features like cooling or heating means, linings, pouring nozzles and closure means;

Working methods of these vessels.

References

Limiting references

This place does not cover:

Converters	C21C 5/42 - C21C 5/50
Furnaces	F27B , F27D

Informative references

Attention is drawn to the following places, which may be of interest for search:

Refractory linings for converters	C21C 5/44
Linings for furnaces	F27D 1/00 - F27D 1/18

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Impact pad	A pad or a boxlike device of erosion resistant material positioned on the floor of a melt-holding vessel to receive the incoming stream of molten metal poured into the said vessel from a higher positioned vessel
Ladle turret	A rotating tower is supporting two casting ladles in such a way that one ladle is 'on cast' (feeding the casting machine) while the other is made ready, and is switched to the casting position once the first ladle is empty.

B22D 43/00

Mechanical cleaning, e.g. skimming of molten metals

Definition statement

This place covers:

Removing or holding back dirt or slag from the surface of the molten metal before or during casting.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Removing or retaining slag in furnaces	F27D 3/1545 - F27D 3/159
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B22D 45/00

Equipment for casting, not otherwise provided for

Definition statement

This place covers:

Any kind of casting equipment for which no specific entry exists.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Removal of waste gases or dust during steel making	C21C 5/38
Extraction of waste gases in furnaces	F27D 17/00

B22D 46/00

Controlling, supervising, not restricted to casting covered by a single main group, e.g. for safety reasons (controlling or regulating in general [G05](#))

Definition statement

This place covers:

Any kind of controlling which is not associated with a single specific casting process.

References

Limiting references

This place does not cover:

Controlling or regulating processes during continuous casting	B22D 11/16 - B22D 11/225
Controlling in centrifugal casting	B22D 13/12
Controlling equipment in injection die casting machines	B22D 17/32
Controlling pouring from a melt-holding vessel	B22D 37/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Controlling in general	G05
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B22D 47/00

Casting plants

Definition statement

This place covers:

The lay-out of a casting plant which may comprise a combination of machines used during the whole casting process, eventually together with the preceding moulding plant.