CHILLED CONTINUOUS CASTING MOULD
FOR CASTING METAL

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ABSTRACT
A cooled continuous casting mold for casting metal, in particular steel, in slab format and having, in particular, a thickness between 40 and 400 mm and a width from 200 mm to 3,500 mm, with mold walls formed of plates in which cooling medium channels for cooling are formed, is so improved that the thermal loading over the mold profile is uniform and, therefore, the hot face temperature of the liquid metal level may be reduced, and to this end, a width (26.1) of the cooling medium channels (29) is reduced, in a casting direction dependent on a thermal flow profile (2.1), over a mold height (13) from a mold inlet (13.1) to a mold outlet (13.2).
21.6  27.2  10  1  18.1  18.3  14  34  23
P  J  l  slag  V  slab  thickness
bar  %  m/s  MW/m²  mm  mm  m/min  mm  °C
32 thin seal:  12/8  60/40  12/8  2.2/3.2  25/15  0.4/0.2  4.0/8.0  150/40  300/400
33 standard slab:  10/6  25/15  10/6  0.8/1.6  50/30  2.0/1.0  0.8/2.0  400/150  250/350

\[ U = R \cdot J = \sum \left( \frac{1}{\lambda} \cdot F \right)_i \cdot J \]

27.2 \( \equiv \) 20 F-Form \( \equiv \) water overlay entire mold in m² (%)

\[ \lambda_{\text{Steel}} \equiv 50 \text{ W/mK} \]
\[ \lambda_{\text{Slag}} \equiv 1 \text{ W/mK} \]
\[ \lambda_{\text{Cu}} \equiv 350 \text{ W/mK} \]
\[ \lambda_{\text{SEN}} \equiv 10 \text{ W/mK} \]

31 Recrystallisation temperature Cu: 350–(500) 700 °C

Fig. 2

According to Cu-quality
CHILLED CONTINUOUS CASTING MOULD FOR CASTING METAL

[0001] The invention relates to a cooled continuous casting mold for casting metal, in particular steel, in slab format and having, in particular, a thickness between 40 and 400 mm and a width from 200 mm to 3,500 mm, with mold walls formed of plates and with cooling medium channels for cooling.

[0002] With the help of FIG. 1, the known interrelationships during continuous casting of metal will be described. The continuous casting of metal, in particular steel, with oscillating molds 1, but also with displacement or travelling molds formed, e.g., as twin-roller with a stationary roller core and a circumferential mold tubular shell, leads to a thermal flow J(2) along a potential drop U(3) from the mold or strand center 4 through the formed strand shell 5, a usually available slag film 6 on the mold plate 7.1 with a predetermined copper plate thickness 8 and up to the mold cooling water 9. Here, the numeral 8 designates the thickness of the copper plate between the slag and the mold cooling water course or between hot and cold faces. The mold cooling water 9 flows, with a controlled velocity (10), measured, e.g., in m/s, a predetermined pressure (11) which is measured in bar at the mold cooling water inlet, and a controlled mold cooling water inlet temperature, T=O(12) which is measured at the mold cooling water inlet, parallel to the mold height 13 in or against a direction 14 of the continuous casting which is measured in m/min, in order to absorb and remove the existing thermal flow J(2). The total thermal flow J(2), which is removed by the mold cooling water 9, is determined by a total resistance R-total (15) which is determined by separate media 16 with their separate resistances Ri(17) between the strand middle 4 and the mold cooling water 9. The separate or discrete resistances 17 are determined by their length 1 (18), their specific thermal conductivity λ(19), and their conducting cross-section F(20), and determine, together with the potential drop U(3) and the thermal flow J(2), the mass flow equation (20.1). In this equation, the discrete resistances of separate media enter, between the mold center or middle 4 and the course of the mold cooling water, as the resistance of the liquid steel, the strand shell, the refractory lining, and the mold plate which is formed, in particular, of copper.

[0003] The incoming thermal flow at the face boundary 21 between the copper plate 7 and the course of the cooling water 9 (called “cold face”) must overcome the interface resistance 22 between the copper of the mold plate and the cooling water, with the copper plate 7 defining a hot face temperature or a temperature gradient 25 between the face boundaries 21 and 21.1 which designates a face boundary between the copper plate 7 and the slag film 6 or the strand shell 5. The temperature gradient depends on the strength of the thermal flow over the mold height (13) and on the interface resistance at the boundary face copper/water (21). It is also known that the thermal flow diminishes from the liquid metal level 30 to the mold outlet 13.2 in accordance with a profile 2.1 known as a “thermal beam.”

[0004] The interface resistance 22 is determined by the size of the cooling channels 26 extending parallel to each other over the mold height 13, here in form of cooling slots, and having a width (26.1), depth (26.2), which define a flow cross-section Q (26.3), and a length (26.4) corresponding somewhat to the mold height (13) minus the boundary layer (Nernst layer) of the cooling water, which represents a function of the flow velocity (FIG. 3c). The resistance 17 is determined from the percentage water overlay (27.2) over the mold width determined as a difference between a maximal cooled mold width and non-directly cooled mold width divided by the cooled mold width, or also in a first approximation, defined as a distance cooling channel/cooling channel 27 minus the web width 2.1 divided by the distance cooling channel/cooling channel (see FIG. 3e). This relative water overlay corresponds to the conducting cross-section F (20) expressed through a mass flow equation U=2ReJ. Further, the resistance 17 depends on the thickness (8) of the copper plate and on the specific thermal conductivity λ (19) and further on the water velocity (10) which is a function of the water pressure (26.6) at the water inlet and the flow resistance (26.5) or of the pressure loss in the mold. The relative water overlay (27.2) can also be looked at as the conducting cross-section F (20) in the sense of the mass flow equation U=2ReJ which, in the known molds, is constant over the mold height (13), i.e., with cooling channels extending parallel to each other.

[0005] In the known molds, the interface resistance 22 is constant over the mold height 13. The cooling channel can be formed either as cooling bores 28 (not shown) with a constant diameter and with or without displacement bars 28.1 or as cooling slots 26 with water guiding plates 26.7 (FIGS. 3d and 3e) with a constant cross-section (26.3).

[0006] In summary, it can be said that according to the state of the art, in any mold format (in slab, bloom, billet, profile and strip plants, etc.), the percentage water overlay (27.2) over the mold width, whether the cooling bore 28 or the cooling slots 26 are used, and over the mold height 13 geometrically and, therefore, in its operational cooling action remains uniform.

[0007] These ISO-design or uniform design of the mold cooling over the mold height leads, as a result of a strand shell being located closely adjacent to the wall immediately beneath the liquid metal level 30 and a following shrinkage of the strand shell 5 over the mold height 13, to an increased thermal flow and thereby simultaneously to a high hot face temperature of the copper plate 23. This high temperature of the copper plate 23 leads to a danger of the recrystallization temperature T-Cu—Re (31) of the rolled copper (see FIG. 3c) being exceeded.

[0008] This danger of exceeding the recrystallization temperature (T-Cu—Re) of the mold plate increases with increased casting velocities. FIG. 2 shows an overview of constructional and operational characteristics of thin slab and standard slab molds, in form of a table.

[0009] This tabular representation of the characteristic mold data shows that an increased thermal loading of the mold represented by a load of 2.2/3.2 MW/m², which characterizes the thermal flow (2) or the thermal loading of the mold, in case of a thin slab (32) in comparison with a standard slab (33), leads to a larger percentage water overlay (27.2) of 60-40%, an increased water velocity (10) of 12-8 m/s, a smaller copper plate thickness (18.1) of 25-15 mm, and a higher mold cooling water pressure (26.6) of 12-8 bar. This increased thermal loading or the increased thermal flow in the mold leads, in case of a thin slab (32), to a reduced slag film thickness (18.2) of 0.4-0.2 mm, an increased
casting velocity (14) of the thin slab (32), and a smaller slab thickness (34.32) or (34.3). Simultaneously, one can see that the mold hot face temperature at the, adjacent to the steel, side (23), dependent on the casting velocity, lies between 300° C. and 400° and closer to the recrystallization temperature (31) of the cold rolled copper than for the standard slab. The recrystallization temperature of the cold rolled copper lies, dependent on the copper quality, between 350° C. (Cu—Ag) and 700° C. (Cu—CuZr) or 500° C. (softening temperature).

[0010] A further reduction of the Cu-plate thickness (18.1) because of high water pressure (at the mold cooling water inlet (26.6)) in the bores (28) or cooling slots (26) and a resulting possible mechanical bulging of the adjacent to the steel, copper plate surface, hot face, would be difficult to achieve.

[0011] FIG. 3 shows a known arrangement of water cooling for slab or thin slab molds with cooling channels 26 and water guiding plates 26.7. FIG. 3a shows a half of a broad side 7 of a slab mold with a narrow side 7.1, an immersion inlet 35, steel flow 36, and a strand 37 with a strand shell 5 at the mold outlet. This figure also shows cooling channels 26 extending parallel to each other over the mold height 13, and the position of the liquid metal level 30.

[0012] FIG. 3b shows a cross-sectional view through the mold broad side 7 with a water box 38 with a water inlet 38.1 and a water return or the water box inlet 38.2. 38.1.1 or 38.2.1 designate transitions of the mold cooling water from the water box (38.1) into the cooling channels (26) or into the cooling bores (28 not shown).

[0013] FIG. 3b further shows a multi-part mold with locking bolts 39 which connect the copper plate 40 with cooling slots with the water box 38 or the copper plate 40.1 without cooling slots with the water box 38 (see also FIG. 3d). In case the copper plate 40.1 without cooling slots is used, an intermediate plate 41 with cooling slots 26.3 is provided. Alternatively, the intermediate plate 41 can form directly the wall of the water box 41.1 (FIG. 4).

[0014] FIG. 3c shows the profiles of the mold hot face temperature 23, the thermal flow J (2), and the recrystallization temperature T-Cu—Re (31) over the mold height 13 according to the state of the art.

[0015] FIG. 3c shows that both profiles (23.1) (hot face temperature profile) and (2.1) (thermal flow profile) are functionally similar, and that the thermal loading (23) is close to the recrystallization temperature 31 of copper, in particular, at high casting speeds which results in a short service life of the copper plate in the region of the liquid metal level 30.

[0016] FIG. 3d shows a horizontal cross-section through the mold and shows the arrangement of the parallel cooling slots 26 with water guiding plate 27 and the transitions (38.1/38.2.1) of the cooling water 9 from the water box outlet 38.1 into the cooling channels and from the cooling channels through the mold water transition 38.2.1 to the water return 38.2.

[0017] FIG. 3e shows a horizontal cross-section of parallel cooling slots 26. The figure shows the slot width 26.1, the percentage water overlay 27.2 which is determined by the ratio of the cooling channel width to the distance cooling channel/cooling channel 27, the cooling channel cross-section 26.3, the water guiding plates 26.7, the distance cooling channel/cooling channel 27, and the copper plate thickness 8. The constructive features over the old height are shown in cross-sectional views A-A'—A11 and B-B'—B11, with a constant conducting cross-section F (20) and a constant interface resistance (22) over the mold height being set based on the uniform thermal flow of the mold cooling water 9 with a constant Nernst phase region (flow velocity= 0) which is smaller at an increase flow velocity (10).

[0018] FIG. 4 shows possible know designs of a mold broad side 7 formed of a copper plate and a water box 38. The mold can be formed of a copper plate 40 with cooling slots and a water box 38 (FIG. 4a), or of a copper plate 40.1 without cooling slots 40.1 and with an intermediate plate 41 with cooling slots (sandwich) and the water box (FIG. 4b), or of a copper plate 40.1 without cooling slots 40.1, which are provided in an intermediate plate 41.1 that forms a wall of the water box (FIG. 4c). FIG. 4d shows the profiles of the thermal flow J (2.1), the thermal loading over the mold height, and the recrystallization temperature (31) of the cold rolled copper plate.

[0019] The object of the invention is to provide a continuous casting mold in which the thermal loading over the mold height, i.e., the thermal profile over the mold height is uniform, whereby the mold hot face temperature at the liquid metal level can be reduced.

[0020] This object is achieved with a continuous casting mold having the features of claim 1. Advantageous embodiments are set forth in the subclaims.

[0021] It is proposed, according to the invention, to improve the continuous casting mold by reducing the width of the cooling medium channel in the casting direction from the mold inlet to the mold outlet in accordance with the thermal flow profile over the mold height.

[0022] The width designates the length of extension of the channel wall which (substantially) extends along the hot plate inner wall. Here, the cooling channels have preferably a rectangular cross-section. However, use of elliptical shapes can also be contemplated.

[0023] According to the invention, the face boundary surface between the mold plate wall and the cooling water diminishes from the mold inlet to the mold outlet.

[0024] According to a first embodiment, the width of the cooling medium channels diminish approximately functionally to the thermal flow profile over the mold height between the mold inlet and the mold outlet in the casting direction, whereby the boundary lines or surfaces of a cooling medium channel or adjacent cooling medium channels do not extend parallel to each other.

[0025] According to a second embodiment, the width of the cooling medium channels diminishes approximately linear in the casting direction, whereby the boundary lines or surfaces of a cooling medium channel or adjacent cooling medium channels extend not parallel to each other, but at an acute angle to each other.

[0026] This means that the width of a cooling channel diminishes linearly over the mold height, whereby the boundary surfaces of adjacent channels, which have a rectangular cross-section, extend to each other at a defined
angle, or the lines of adjacent channels, which have an elliptical cross-section, viewed in a plane extending through common center points of the channels and parallel to the cooled plate surface, form with each other a defined angle.

[0027] According to a particular advantageous embodiment, the cooling channels are so formed that the depth of the channels over the mold height increases from the mold inlet to the mold outlet in the casting direction.

[0028] The depth is a measurement of the cooling channels which, together with the width, is taken into account when calculating the surface area.

[0029] According to a particular advantageous embodiment, dependent on a reduction of the width, an increase of the depth over the mold height so changes that a size of a respective cross-sectional surface of a cooling channel remains constant from the mold inlet to the mold outlet, so that flow velocity of a cooling medium, in the cooling medium channels, remains constant from the mold inlet to the mold outlet. Because of a constant resistance of a cooling channel between the mold cooling water inlet and the mold cooling water outlet, the flow velocity of the cooling water does not change.

[0030] Preferably, the water boxes are used for supplying the cooling channels formed in the mold wall plates. Here, the water box outlet is provided at the height of the mold inlet, and water box inlet is provided at the height of the mold outlet. Advantageously, the water delivery takes place above the liquid metal level at the mold inlet, and the water return takes place at the mold outlet, thereby in the region of the liquid metal level beneath which largest thermal loading occurs, a cold, thermally non-loaded water with the greatest cooling capacity or most remote from the vaporization point of water at a pressure between 1 and 25 bar.

[0031] Other advantageous features are disclosed in claims 7 through 12.

[0032] As cooling channels, cooling slots or cooling boxes can be used. The cooling channels are provided in a side of the plate remote from the mold side or in a separate intermediate plate. To obtain desired cross-sectional surfaces, the cooling slots are closed, over the mold height, with correspondingly formed water guiding plates the width of which is adapted, over the mold height from the mold inlet to the mold outlet, to the changes of the width of the cooling channel course, i.e., is reduced, and their thickness advantageously correspondingly diminishes over the mold height from the mold inlet to the mold outlet, so that they flush adjoin the remote side of the plate.

[0033] FIGS. 1 through 4 show the prior art, and FIGS. 5 and 6 show the invention. The prior art has already been described in detail. The invention will only be described by way of example in comparison with the prior art based on FIGS. 5 and 6. The elements the same as in FIGS. 1-4 are designated with the same reference numerals.

[0034] FIG. 5 shows an invention in which adjacent cooling channels 29 or their border lines do not extend parallel but rather have their width reduced from the mold inlet 13.1 or the liquid metal level 30 and to the mold outlet 13.2, so that the channel cross-section or the conducting surface F (20) functionally corresponds to the thermal flow density or to the thermal flow profile 2.1. Simultaneously, by a corresponding increase of the cooling channel depth 26.2 (FIG. 5b), the flow cross-section Q (26.3) for the cooling water and thereby the flow velocity 26.5 of the water in the mold 1 is retained substantially constant. The border surfaces of the cooling channels in form of slots 29 do not extend any more parallel to each other but form an acute angle 29.2 with each other. The percentage water overlay 27.2 or the conducting cross-section 29 is, e.g., at the liquid metal level 30, maximum 100% in case of casting a thin slab, and at the mold outlet minimum 50%.

[0035] FIG. 5c shows a comparative thermal loading 23.3 of the mold plate over the mold height in comparison with the thermal flow profile 2.1 and the recrystallization temperature 31. The drawing figure shows that the hot fall temperatures 23.2 of the cooper plate 7 is smaller, more uniformly distributed, and simultaneously, increases the service life of the cooper plate.

[0036] FIGS. 5d shows cross-sections A-A' and B-B' through the broad sides 7 at the mold inlet 13.1 and the mold outlet 13.2 for both mold plate 40 with non-parallel cooling slots and the sandwich solution, i.e., a mold plate with an intermediate plate 41 in which the non-parallel cooling channel 29 according to the present invention are formed.

[0037] This drawing figure also makes clear, e.g., that the flow velocity, despite a large water overlay in the region of the liquid metal level 30, remains constant because the flow cross-section Q (26.3) remains constant as a result of the corresponding increase of the cooling channel depth 26.2 over the mold height from the mold inlet to the mold outlet.

[0038] FIG. 5e shows the cooling channels 29 at the mold inlet 13.1 and the mold outlet 13.2 with their guiding plates 29.1 the width and thickness of which changes.

[0039] FIG. 6 shows a comparison of the solution according to the invention (FIG. 6b) with the prior art (FIG. 6a). Basically, the proposed solution with regard to the cooling channels 29 with guiding plates 29.1 is transferable to molds with cooling boxes (not shown), with the bore cross-sections being changes, along the mold length, by using conical displacement bars (not shown).

LIST OF REFERENCE NUMERALS

[0040] 1. Oscillating mold
[0041] 2. Thermal flow
[0042] 2.1 Profile of the thermal flow over the mold height, ("thermal beam")
[0043] 3. Drop of Potential, U
[0044] 4. Mold or strand center
[0045] 5. Strand shell
[0046] 6. Slag film
[0047] 7. Mold plate-broad side
[0048] 7.1 Mold plate-marrow side
[0049] 8. Cooper plate thickness between slag and water or between hot and cold face
[0050] 9. Mold cooling water
[0051] 10. Velocity of the mold cooling water, in m/s
[0052] 11. Pressure of the mold cooling water at the mold cooling water inlet in bar.

[0053] 12. Temperature of the mold cooling water at the cooling water inlet, T-O in °C.

[0054] 13. Mold height parallel to the casting velocity in a withdrawal direction or along the mold length.

[0055] 13.1 Mold inlet

[0056] 13.2 Mold outlet

[0057] 14. Strand casting direction with the casting velocity in m/min (max. 15 m/min)

[0058] 15. Total resistance, R-total.

[0059] 16. Individual media between the mold center (4) and mold water (9) such as e.g., liquid steel, refractory material, strand shell, slag, mold plate, e.g., of copper

[0060] 17. Discrete resistance, Rl

[0061] 18. Resistance length R in m

[0062] 18.1 Thickness of the copper plate 1-Cu, hot/cold face, in mm

[0063] 19. Specific thermal conductivity, λ, in W/Kmxm

[0064] 20. Conducting cross-section, F.

[0065] 20.1 Mass flow equation \( U = \sum R_i \cdot \dot{X} \).

[0066] 21. Face boundary copper plate (7)/mold cooling water (9), cold face

[0067] 21.1 Face boundary copper plate (7), slag film (6) or strand shell (5), hot face

[0068] 22. Interface resistance copper/water, Nernst boundary layer

[0069] 23. Hot face temperature copper/case shell (hot face) of parallel channels (26)

[0070] 23.1 Profile of hot face temperature over the mold height.

[0071] 23.2 Hot face-temperature of non-parallel cooling channels.

[0072] 23.2.1 Thermoprofile of non-parallel cooling channels (29).

[0073] 24. High temperature copper/water (cold face)

[0074] 25. Profile of the temperatures cooper/water (cold face)

[0075] 26. Cooling channels formed as cooling slot extending parallel to each other over the mold height.

[0076] 26.1 Cooling channel width

[0077] 26.2 Cooling channel depth.

[0078] 26.3 Cooling channel cross-section or flow cross-section, Q

[0079] 26.4 Cooling channel length corresponding to the mold height (13)

[0080] 26.5 Flow resistance

[0081] 26.6 Water pressure at the mold inlet

[0082] 26.7 Water guiding plates

[0083] 27. Distance, cooling channel/cooling channel

[0084] 27.1 Web Width

[0085] 27.2 Percentage water overlay over the mold width defined as difference between a maximum cooled mold width less non-directly cooled width divided by a cooled mold width or also in I approximately as a distance cooling channel/cooling channel less the web width divided by the distance cooling channel/cooling channel, corresponding to conduct cross-section, F (20) in a sense of mass flow equation (20)

[0086] 28. Cooling bores

[0087] 28.1 Displacement phase, displacement body

[0088] 29. Cooling channels, displacement bars, extending non-parallel over the mold height (3)

[0089] 30. Region of the liquid metal level, liquid metal level

[0090] 31. Recrystallization temperature of a cold rolled mold copper plat T-Cu—Re.

[0091] 32. Thin slabs, thin slab thickness 40-150 mm

[0092] 33. Standard slabs, slab thickness 400-150 mm.

[0093] 34. Slab thickness, strand thickness

[0094] 34.1 Thin slabs from 150 to 40 mm

[0095] 34.2 Standard slabs from 400 to 150 mm

[0096] 35. Immersion inlet, SEN

[0097] 35.1 Cast compound

[0098] 35.2 Cast slag

[0099] 36. Steel flow

[0100] 37. Strand

[0101] 38. Water box

[0102] 38.1 Water inlet, water outlet

[0103] 38.1.1 Transition for the mold cooling water from the water box (38.1) in the cooling channels (26) or (29)

[0104] 38.2. Water return flow, water box inlet

[0105] 38.2.1 Transition of the mold cooling water from the cooling channels (26) or (29) in the water box (38.2)

[0106] 39. Locking bolts water box/cooper plate

[0107] 40. Copper plate with cooling channels

[0108] 40.1. Copper plat without cooling channels and with an intermediate plate (41)

[0109] 41. Intermediate plate, with cooling channels (sandwich)

[0110] 41.1. Intermediate plate (41) with cooling channels that forms directly the water box wall.

1. A cooled continuous casting mold for casting metal, in particular steel, in slab format and having, in particular, a thickness between 40 and 400 mm and a width from 200 mm to 3,500 mm, with mold walls formed of plates (7, 7.1) and with cooling medium channels for cooling, characterized in that a width (29.1) of the cooling medium channels (29) is reduced, in a casting direction dependent on a thermal flow
profile (2.1), over a mold height (13) from a mold inlet (13.1) to a mold outlet (13.2).

2. A cooled continuous casting mold according to claim 1, characterized in that the width (26.1) of the cooling medium channels diminishes, in a casting direction approximately functionally according to the thermal flow profile over the mold height (13) between the mold inlet (13.1) and the mold outlet (13.2).

3. A cooled continuous casting mold according to claim 1, characterized in that the width (26.1) of the cooling medium channels diminishes, in the casting direction, approximately linearly, wherein the boundary lines or surfaces of a cooling medium channel or adjacent cooling medium channels extend not parallel to each other but at an acute angle (29.2) toward each other.

4. A cooled continuous casting mold according to claim 1, 2, or 3, characterized in that depth (26.2) of the cooling medium channels increases, in the casting direction, over the mold height (13) from the mold inlet (13.1) toward the mold outlet (13.2).

5. A cooled continuous casting mold according to claim 4, characterized in that dependent on a reduction of the width, an increase of the depth (26.2) over the mold height (13) so changes that a size of a respective cross-sectional surface (26.3) of a cooling channel remains constant from the mold inlet (13.1) to the mold outlet (13.2), so that the flow velocity of a cooling medium, in the cooling medium channels, remains constant from the mold inlet (13.1) to the mold outlet (13.2).

6. A cooled continuous casting mold according to any of claims 1 through 5, characterized in that water boxes adjoin the plates (7, 7.1) of the mold walls, in particular, copper plates for supplying the cooling channels, wherein water box outlet (38.1) is arranged at a height of the mold inlet (13.1) and a water box inlet (38.2) is arranged at height of the mold outlet (13.2).

7. A cooled continuous casting mold according to any of claims 1 through 6, characterized in that a percentage cooling medium overlay, in particular, water overlay, which is defined by a ratio of a difference between a maximally cooled mold width and a non-directly cooled mold width to the cooled mold width, at mold inlet (13.1), in particular at a height of liquid metal level (30), amounts maximum to 100%, in particular 100%, and at the mold outlet (13.2) minimum to 30%, in particular, minimum 30%.

8. A cooled continuous casting mold according to any of claims 1 through 7, characterized in that cooling medium, cooling water flows over a channel length with a flow velocity between 25 and 2 m/s.

9. A cooled continuous casting mold according to any of claims 1 through 8, characterized in that a thickness of a copper plate (7, 7.1), between melt and the cooling water course, is no smaller than 5 mm.

10. A cooled continuous casting mold according to any of claims 1 through 9, characterized in that a mold cooling water pressure (11) at a water box outlet (38.1) amounts to between 2 and 25 bar.

11. A cooled continuous casting mold according to any of claims 1 through 10, characterized in that a strand casting velocity Vb (14) amounts to between 1 and 15 m/min.

12. A cooled continuous casting mold according to any of claims 1 through 11, characterized in that it operates by feeding steel melt through an immersion nozzle (SEN) (35) and by feeding a cast compound, and in that the mold is an oscillating mold.

13. A cooled continuous casting mold according to any of claims 1 through 12, characterized in that the cooling channels are formed as cooling slots (29) provided in the plate (7, 7.1) before formation of a remote side of the plate (7, 7.1), and that the cooling slots (29) are closed, for obtaining predetermined cross-sectional surfaces over the mold height (13), with correspondingly formed water guiding plates a width of which over the mold height (13) is adapted, from the cooling water inlet (13.1) to the cooling water outlet (13.2), to the width change of the cooling channel course.

14. A cooled continuous casting mold according to any of claims 1 through 12, characterized in that the cooling channels are formed as cooling bores into which displacement bars are inserted.

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