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(54) Hot-dip galvanising alloy and process

(57) Alloy and process for galvanising steel by immersion in a zinc alloy containing bath comprising by weight 0.1 to less than 1% Bi, 0.01 to 0.05% Al, 0.04 to 0.12% Ni up to 0.05% Mn, the rest being zinc and unavoidable impurities.

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Description

[0001] The present invention relates to a bath for hot-dip galvanising consisting of alloyed zinc, that is particularly useful for batchwise galvanising steel articles. 5

[0002] Conventional galvanisation practice results in a coating thickness of 70 to 120 μm . A drawback of such thick coatings is the reduced resistance to stress induced crack formation.

[0003] The aim of the present invention is therefore to provide a bath composition for hot-dip galvanising, which results in a coating thickness of 30 to 50 μm . Also, the thickness of the intermetallic layer is reduced to approximately 30 to 35 μm . This induces an increased resistance to stress induced crack formation as required e.g. for critical parts in the automotive industry. 10

[0004] According to the invention the bath contains, by weight, 0.1 to less than 1 % Bi, 0.01 to 0.05 % Al, 0.04 to 0.12 % Ni, up to 0.05 % Mn, the rest being zinc and unavoidable impurities. Preferably, the bath contains 0.3 to 0.8 % Bi, 0.02 to 0.04 % Al, 0.06 to 0.10 % Ni and up to 0.05 % Mn. A bath composition with 0.5 % Bi, 0.03 % Al and 0.08 % Ni is especially preferred. 15

[0005] The galvanising process using the alloy of the invention is particularly suitable for coating low reactivity steel. By low reactivity steel is meant steel comprising, by weight, Si and P in such amounts that $\text{Si} < 0.03\%$ and $\% \text{Si} + 2.5 \times \% \text{P} < 0.09$. 20

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Claims

1. An alloy for hot-dip galvanising steel comprising, by weight, 0.1 to less than 1 % Bi, 0.01 to 0.05 % Al, 0.04 to 0.12 % Ni, up to 0.05 % Mn, the rest being zinc and unavoidable impurities. 35
2. An alloy according to claim 1, comprising, by weight, 0.3 to 0.8 % Bi, 0.02 to 0.04 % Al, 0.06 to 0.10 % Ni, up to 0.05 % Mn, the rest being zinc and unavoidable impurities. 40
3. A process for galvanising steel by immersion in a zinc alloy galvanising bath comprising the step of immersing the steel articles in a molten bath of a zinc alloy comprising, by weight, 0.1 to less than 1 % Bi, 0.01 to 0.05 % Al, 0.04 to 0.12 % Ni, up to 0.05 % Mn, the rest being zinc and unavoidable impurities. 45
4. A process according to claim 3, **characterised in that** the steel articles comprise, by weight, Si and P in such amounts that $\text{Si} < 0.03\%$ and $\% \text{Si} + 2.5 \times \% \text{P} < 0.09$. 50

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EUROPEAN SEARCH REPORT

Application Number

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Category	Citation of document with indication, where appropriate, of relevant passages								
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)						
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of completion of the search</td> <td style="width: 33%;">Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>8 February 2001</td> <td>Elsen, D</td> </tr> </table>				Place of search	Date of completion of the search	Examiner	THE HAGUE	8 February 2001	Elsen, D
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THE HAGUE	8 February 2001	Elsen, D							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">CATEGORY OF CITED DOCUMENTS</td> <td style="width: 50%;">T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- S : member of the same patent family, corresponding document</td> </tr> <tr> <td>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : Intermediate document</td> <td></td> </tr> </table>				CATEGORY OF CITED DOCUMENTS	T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- S : member of the same patent family, corresponding document	X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : Intermediate document			
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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