

(19)



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(11)

**EP 1 186 679 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:

**13.03.2002 Bulletin 2002/11**

(51) Int Cl.7: **C23C 2/06**

(21) Application number: **00203141.7**

(22) Date of filing: **12.09.2000**

(84) Designated Contracting States:

**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**

Designated Extension States:

**AL LT LV MK RO SI**

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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  $\mu\text{m}$ . 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  $\mu\text{m}$ . Also, the thickness of the intermetallic layer is reduced to approximately 30 to 35  $\mu\text{m}$ . This induces an increased resistance to stress induced crack formation as required e.g. for critical parts in the automotive industry. 10 15

**[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. 20

**[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  $\% \text{Si} + 2.5 \times \% \text{P} < 0.09$ . 25

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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

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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  $\% \text{Si} + 2.5 \times \% \text{P} < 0.09$ . 55

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# EUROPEAN SEARCH REPORT

Application Number  
EP 00 20 3141

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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Place of search	Date of completion of the search	Examiner	
THE HAGUE	8 February 2001	Elsen, D	
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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 &amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/92 (P04031)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 00 20 3141

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