

Title (en)

Process for heat treating an electrical steel sheet

Title (de)

Verfahren zum Wärmebehandeln eines Elektrolech-Stahlbands

Title (fr)

Procédé de traitement thermique pour une tôle magnétique

Publication

**EP 1795617 A1 20070613 (DE)**

Application

**EP 06125750 A 20061208**

Priority

DE 102005059308 A 20051209

Abstract (en)

Heat treatment method for steel strip comprises continuous annealing followed by cooling in three stages. In the first stage the strip is cooled to a temperature 50[deg]C above the Curie temperature. In the second stage it is cooled to 80[deg]C below the Curie temperature and in the final stage with a cooling gradient up to 85[deg]C/s. Heat treatment method is used for steel strip with an Si and Al content (wt%) given by the relationship:  $0.9 \leq \text{Si} + 2 \times \text{Al} \leq 1.8$ , an Mn content up to 2.5 wt%, up to 1 wt% of each of P, Cr and Ni and up to 0.1 wt% of each of C, N and S. The method comprises continuous annealing followed by cooling in three stages. In the first stage the strip is cooled to a temperature 50[deg]C above the Curie temperature with a cooling gradient of -38[deg] to -1[deg]C/s. In the second stage it is cooled to 80[deg]C below the Curie temperature. The cooling gradient has an upper limit (CR 2 M A X) given by:  $\text{CR 2 M A X} = \pi (\cos(2(\text{T B A N D} - \text{T C}))^{1/2} \cdot ((\text{T B A N D} - \text{T C})^{(1/2)} \cdot 2 + 1)) - 1) - \pi$ . Its lower limit (CR 2 M I N) is given by:  $(\text{CR 2 M I N}) = 3\pi (\cos(2(\text{T B A N D} - \text{T C}))^{1/2} \cdot ((\text{T B A N D} - \text{T C})^{(1/2)} \cdot 2 + 1)) - 1) - \pi$ . In the final stage the cooling gradient is up to 85[deg]C/s.

IPC 8 full level

**C21D 6/00** (2006.01); **C21D 8/02** (2006.01); **C21D 8/12** (2006.01); **C21D 9/52** (2006.01); **C21D 9/46** (2006.01)

CPC (source: EP)

**C21D 6/00** (2013.01); **C21D 8/0273** (2013.01); **C21D 9/46** (2013.01)

Citation (applicant)

- EP 0357797 A1 19900314 - NIPPON KOKAN KK [JP]
- JP S5296919 A 19770815 - KAWASAKI STEEL CO

Citation (search report)

- [X] JP S5296919 A 19770815 - KAWASAKI STEEL CO
- [DA] EP 0357797 A1 19900314 - NIPPON KOKAN KK [JP]
- [A] EP 0538519 A1 19930428 - ARMCO INC [US]
- [A] JP H04221019 A 19920811 - SUMITOMO METAL IND
- [A] US 3130088 A 19640421 - COOK LOWELL L
- [A] DE 1583349 A1 19730816 - CREUSOT LOIRE

Designated contracting state (EPC)

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR

Designated extension state (EPC)

AL BA HR MK YU

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DOCDB simple family (application)

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