

Title (en)

Grain oriented electrical steel sheet having high magnetic flux density and ultra low iron loss and process for producing the same

Title (de)

Kornorientiertes Elektroblech mit hoher Flussdichte und geringen Eisenverlusten und Herstellungsverfahren

Title (fr)

Tôle d'acier électrique à grains orientés ayant une haute densité de flux et une faible perte dans le fer et procédé d'élaboration

Publication

**EP 0577124 B1 20021016 (EN)**

Application

**EP 93110517 A 19930701**

Priority

- JP 17579092 A 19920702
- JP 20679592 A 19920803
- JP 22050092 A 19920819
- JP 28478792 A 19921022
- JP 30272892 A 19921112
- JP 34074692 A 19921221

Abstract (en)

[origin: EP0577124A2] A grain oriented electrical steel sheet having no significant glass film and having a high magnetic flux density and an excellent iron loss property, comprising, in terms of by weight, 2.5 to 4.5% of Si, the steel sheet having, as oxides on its surface, a glass film comprising 0.6 g/m<sup>2</sup> or less in total of forsterite and spinel composed of MgO, SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> and an insulating coating having a thickness of 6 μm or less, the face tension imparted on the surface of the steel sheet by the coating being in the range of from 0.5 to 2.0 kg/mm<sup>2</sup>. In the final box annealing of the steel sheet after primary recrystallization annealing, use is made of an annealing separator comprising 100 parts by weight of MgO and, added thereto, 2 to 30 parts by weight of at least one member selected from the group consisting of chlorides, carbonates, nitrates, sulfates and sulfides of Li, K, Bi, Na, Ba, Ca, Mg, Zn, Fe, Zr, Sr, Sn, Al, etc., and the heating in the final box annealing is effected in an atmosphere comprising N<sub>2</sub> and H<sub>2</sub> with the nitrogen content being 30% or more at a heating rate of 20 DEG C/hr or less, and a seam or spotty flaw is imparted at an angle of 45 to 90 DEG to the rolling direction of the steel sheet.

IPC 1-7

**C21D 8/12**

IPC 8 full level

**C21D 8/12** (2006.01); **H01F 1/147** (2006.01)

CPC (source: EP KR)

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Citation (examination)

- JP S60131976 A 19850713 - KAWASAKI STEEL CO
- US 4543134 A 19850924 - TANAKA OSAMU [JP], et al

Cited by

EP2639326A4; US2022119958A1; US2022372589A1; US11753691B2; CN104884646A; EP2949767A4; EP3128028A4; US2021395851A1; EP0684322A3; US5629251A; US2022098692A1; US11939641B2; US11060159B2; US11984249B2; US9728332B2; WO2019096734A1; WO2013056496A1; US10023932B2; US10297375B2; US9406416B2; WO2020193717A1; EP0716151B1

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