

Title (en)
GRAIN-ORIENTED MAGNETIC STEEL SHEET

Title (de)
KORNIORIENTIERTES MAGNETSTAHLBLECH

Title (fr)
TÔLE D'ACIER MAGNÉTIQUE À GRAINS ORIENTÉS

Publication
EP 2460902 A4 20130220 (EN)

Application
EP 10804595 A 20100730

Priority
• JP 2009179494 A 20090731
• JP 2010063343 W 20100730

Abstract (en)
[origin: EP2460902A1] An electrical steel sheet is provided that contains, as components, by mass%, 0.005% or less of C, 1.0% to 8.0% of Si, and 0.005% to 1.0% of Mn; one or more selected from Nb, Ta, V, and Zr such that a total content thereof is 10 to 50 ppm; and the balance being Fe and unavoidable impurities, wherein at least 10% of the content of Nb, Ta, V, and Zr is in the form of precipitates; the precipitates have an average diameter (equivalent circle diameter) of 0.02 to 3 µm; and secondary recrystallized grains of the steel sheet have an average grain size of 5 mm or more. Thus, an electrical steel sheet is provided in which degradation of magnetic characteristics can be reduced in the case of the sheet being sheared, even when the sheet is used for a large transformer having a size of several meters.

IPC 8 full level
C22C 38/00 (2006.01); **B21B 3/02** (2006.01); **C21D 8/12** (2006.01); **C21D 9/46** (2006.01); **C22C 38/14** (2006.01); **C22C 38/60** (2006.01); **H01F 1/16** (2006.01)

CPC (source: EP KR US)
C21D 8/12 (2013.01 - EP KR US); **C21D 8/1272** (2013.01 - EP KR US); **C21D 8/1283** (2013.01 - EP KR US); **C21D 9/46** (2013.01 - EP KR US); **C22C 38/001** (2013.01 - EP KR US); **C22C 38/002** (2013.01 - EP KR US); **C22C 38/008** (2013.01 - EP KR US); **C22C 38/02** (2013.01 - EP KR US); **C22C 38/04** (2013.01 - EP KR US); **C22C 38/06** (2013.01 - EP KR US); **C22C 38/12** (2013.01 - EP KR US); **C22C 38/20** (2013.01 - EP KR US); **C22C 38/34** (2013.01 - EP KR US); **H01F 1/16** (2013.01 - EP KR US); **C21D 2201/05** (2013.01 - EP US)

Citation (search report)
• [Y] JP H10110218 A 19980428 - KAWASAKI STEEL CO
• [Y] JP 2003049250 A 20030221 - KAWASAKI STEEL CO
• [A] EP 0869190 A1 19981007 - KAWASAKI STEEL CO [JP]
• [A] JP 2006299297 A 20061102 - JFE STEEL KK
• [A] WO 0250314 A2 20020627 - THYSSENKRUPP ACCIAI SPECIALI [IT], et al
• See references of WO 2011013858A1

Cited by
EP2933348A4; EP3309271A4; US10643770B2; US10844452B2

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