

Title (en)

LOW DENSITY STEEL WITH GOOD STAMPING CAPABILITY

Title (de)

STAHL VON GERINGER DICHTHE MIT GUTEN PRÄGEEIGENSCHAFTEN

Title (fr)

ACIER A FAIBLE DENSITE PRESENTANT UNE BONNE APTITUDE A L'EMBOUTISSAGE

Publication

EP 2155916 B2 20150311 (FR)

Application

EP 08805524 A 20080429

Priority

- FR 2008000610 W 20080429
- EP 07290624 A 20070516
- EP 08805524 A 20080429

Abstract (en)

[origin: EP1995336A1] Ferritic stainless steel sheet composition comprises: carbon (C) (0.001-0.15 wt.%); manganese (Mn) (= 1 wt.%); silicon (= 1.5 wt.%); aluminum (Al) (6-10 wt.%); titanium (0.020-0.5 wt.%); sulfur (= 0.050 wt.%); and phosphorus (= 0.1 wt.%); and optionally one or more elements comprising chromium (= 1 wt.%); molybdenum (= 1 wt.%); nickel (= 1 wt.%); niobium (= 0.1 wt.%); vanadium (= 0.2 wt.%); and boron (= 0.010 wt.%), where the rest of the composition is constituted of iron and unavoidable impurities resulting from elaboration. Independent claims are included for: (1) a manufacturing process of hot-rolled steel, comprising: supplying the steel composition; flowing the steel in the form of semi-finished product; carrying semi-finished product at temperature of ≥ 1150 [deg] C; hot-rolling the semi-finished product to obtain a sheet, by at least two rolling steps carried out at temperature greater than 1050[deg] C, where the reduction rate of each of two steps are $\geq 30\%$, and the time passes between each of two rolling steps and following rolling step is ≥ 10 seconds; rolling at a temperature (T(FL)) of ≥ 900 [deg] C; cooling the sheet, the time interval between time (t p) passes between 850-700[deg] C is greater than 3 seconds, to obtain a precipitation of precipitates (K); and spooling the sheet at a temperature (T b o b) of 500-700[deg] C; and (2) a manufacturing process of cold rolled and annealed steel sheet, comprising: supplying the hot-rolled steel sheet; cold rolling the sheet with a reduction rate of 30-90% to obtain a cold rolled sheet; heating the cold rolled sheet at a temperature (T') with a speed (V c) of greater than 3[deg] C/s; cooling the sheet at a speed (V(R)) of 100[deg] C/s; and the temperature (T') and the speed is obtained by a complete recrystallization, a linear fraction (f) of intergranular precipitates (K) of less than 30% and a carbon content in solid solution of less than 0.005 wt.%.

IPC 8 full level

C21D 8/02 (2006.01); **C21D 6/00** (2006.01); **C21D 8/04** (2006.01); **C22C 38/00** (2006.01); **C22C 38/04** (2006.01); **C22C 38/06** (2006.01)

CPC (source: EP KR US)

C21D 8/021 (2013.01 - EP KR US); **C21D 8/0215** (2013.01 - EP KR US); **C21D 8/0226** (2013.01 - EP KR US); **C21D 8/0236** (2013.01 - EP KR US); **C21D 8/0247** (2013.01 - EP US); **C21D 8/041** (2013.01 - EP US); **C21D 8/0415** (2013.01 - EP US); **C21D 8/0426** (2013.01 - EP KR US); **C21D 8/0436** (2013.01 - EP KR US); **C21D 9/46** (2013.01 - EP US); **C22C 38/002** (2013.01 - EP US); **C22C 38/004** (2013.01 - KR); **C22C 38/02** (2013.01 - EP US); **C22C 38/04** (2013.01 - EP US); **C22C 38/06** (2013.01 - EP KR US); **C22C 38/14** (2013.01 - EP KR US); **C22C 38/44** (2013.01 - EP US); **C22C 38/48** (2013.01 - EP US); **C22C 38/50** (2013.01 - EP US); **C21D 6/005** (2013.01 - EP US); **C21D 2211/005** (2013.01 - EP KR US)

Citation (opposition)

Opponent :

- U. BRÜX ET AL.: "Light-weight steels based on iron-aluminium - influence of micro alloying elements (B, Ti, Nb) on microstructures, textures and mechanical properties", STEEL RESEARCH, vol. 73, no. 12, 2002, pages 543 - 548
- "Max-Planck-Gesellschaft Jahrbuch", December 2003, K. G. SAUR VERLAG GMBH, MÜNCHEN, pages: 1 - 8

Designated contracting state (EPC)

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR

DOCDB simple family (publication)

EP 1995336 A1 20081126; AR 066569 A1 20090826; AT E490348 T1 20101215; BR PI0811610 A2 20141104; CA 2687327 A1 20081204; CA 2687327 C 20120626; CN 101755057 A 20100623; CN 101755057 B 20120328; DE 602008003801 D1 20110113; EP 2155916 A1 20100224; EP 2155916 B1 20101201; EP 2155916 B2 20150311; ES 2356186 T3 20110405; ES 2356186 T5 20150619; JP 2010526939 A 20100805; JP 2014040668 A 20140306; JP 5552045 B2 20140716; JP 5728547 B2 20150603; KR 101476866 B1 20141226; KR 20100019443 A 20100218; KR 20140129365 A 20141106; MA 31363 B1 20100503; MX 2009012221 A 20091201; PL 2155916 T3 20110531; PL 2155916 T5 20160630; RU 2009146543 A 20110627; RU 2436849 C2 20111220; UA 99827 C2 20121010; US 2010300585 A1 20101202; US 2017101694 A1 20170413; US 9580766 B2 20170228; US 9765415 B2 20170919; WO 2008145872 A1 20081204; ZA 200907619 B 20100526

DOCDB simple family (application)

EP 07290624 A 20070516; AR P080102046 A 20080515; AT 08805524 T 20080429; BR PI0811610 A 20080429; CA 2687327 A 20080429; CN 200880016091 A 20080429; DE 602008003801 T 20080429; EP 08805524 A 20080429; ES 08805524 T 20080429; FR 2008000610 W 20080429; JP 2010507948 A 20080429; JP 2013206098 A 20131001; KR 20097023754 A 20080429; KR 20147027952 A 20080429; MA 32326 A 20091103; MX 2009012221 A 20080429; PL 08805524 T 20080429; RU 2009146543 A 20080429; UA A200912894 A 20080429; US 201615374827 A 20161209; US 60008508 A 20080429; ZA 200907619 A 20091030