

Title (en)

COLD ROLLED NB-CONTAINING FERRITIC STAINLESS STEEL SHEET AND METHOD FOR PRODUCING SAME

Title (de)

KALTGEWALZTES NB-HALTIGES FERRITISCHES EDELSTAHLBLECH UND VERFAHREN ZUR HERSTELLUNG DAVON

Title (fr)

TÔLE D'ACIER INOXYDABLE FERRITIQUE CONTENANT DU NIOBIUM LAMINÉE À FROID ET SON PROCÉDÉ DE FABRICATION

Publication

EP 3708690 A1 20200916 (EN)

Application

EP 20171581 A 20170131

Priority

- JP 2016017883 A 20160202
- EP 17747396 A 20170131
- JP 2017003379 W 20170131

Abstract (en)

The cold-rolled Nb-containing ferritic stainless steel sheet of the present invention has a composition containing C: 0.030 mass% or less, Si: 2.00 mass% or less, Mn: 2.00 mass% or less, P: 0.050 mass% or less, S: 0.040 mass% or less, Cr: 10.00 mass% to 25.00 mass%, N: 0.030 mass% or less and Nb: 0.20 mass% to 0.80 mass%, with the balance being made up of Fe and unavoidable impurities. In this cold-rolled Nb-containing ferritic stainless steel sheet, the precipitation amount of Nb carbonitrides is 0.2 mass% or more, and the number of Laves phases having a grain size of 0.1 µm or less is 10 or fewer per 10 µm² of surface area.

IPC 8 full level

C22C 38/00 (2006.01); **B21B 3/02** (2006.01); **B21B 15/00** (2006.01); **C21D 6/00** (2006.01); **C21D 8/02** (2006.01); **C21D 8/04** (2006.01); **C21D 9/46** (2006.01); **C21D 9/48** (2006.01); **C22C 38/02** (2006.01); **C22C 38/06** (2006.01); **C22C 38/38** (2006.01); **C22C 38/42** (2006.01); **C22C 38/44** (2006.01); **C22C 38/48** (2006.01); **C22C 38/50** (2006.01); **C22C 38/58** (2006.01)

CPC (source: EP KR RU US)

B21B 3/02 (2013.01 - US); **C21D 6/002** (2013.01 - EP US); **C21D 6/004** (2013.01 - US); **C21D 6/005** (2013.01 - US); **C21D 6/008** (2013.01 - US); **C21D 8/02** (2013.01 - EP RU US); **C21D 8/0226** (2013.01 - EP KR US); **C21D 8/0236** (2013.01 - EP KR US); **C21D 8/0263** (2013.01 - EP US); **C21D 8/0273** (2013.01 - US); **C21D 8/0426** (2013.01 - EP US); **C21D 8/0436** (2013.01 - EP US); **C21D 8/0463** (2013.01 - EP US); **C21D 9/46** (2013.01 - EP US); **C21D 9/48** (2013.01 - EP US); **C22C 38/00** (2013.01 - EP US); **C22C 38/01** (2013.01 - EP KR US); **C22C 38/002** (2013.01 - EP US); **C22C 38/02** (2013.01 - EP KR US); **C22C 38/04** (2013.01 - KR); **C22C 38/06** (2013.01 - EP US); **C22C 38/26** (2013.01 - KR RU); **C22C 38/34** (2013.01 - KR); **C22C 38/38** (2013.01 - EP KR RU US); **C22C 38/42** (2013.01 - EP US); **C22C 38/44** (2013.01 - EP US); **C22C 38/48** (2013.01 - EP US); **C22C 38/50** (2013.01 - EP US); **C22C 38/58** (2013.01 - EP US); **B21B 2015/0057** (2013.01 - US); **B21B 2261/21** (2013.01 - US); **C21D 2211/004** (2013.01 - EP US); **C21D 2211/005** (2013.01 - EP KR US)

Citation (applicant)

- JP H10237602 A 19980908 - NISSHIN STEEL CO LTD
- JP 2002030346 A 20020131 - KAWASAKI STEEL CO
- JP 2016017883 A 20160201 - SUMITOMO ELECTRIC INDUSTRIES

Citation (search report)

- [X] JP 2005325377 A 20051124 - NIPPON STEEL & SUMIKIN SST
- [A] JP 2009120893 A 20090604 - NISSHIN STEEL CO LTD
- [A] US 2015020933 A1 20150122 - HAMADA JUNICHI [JP], et al
- [A] US 2009000703 A1 20090101 - HAMADA JUNICHI [JP], et al
- [A] JP 2015190025 A 20151102 - NIPPON STEEL & SUMIKIN SST
- [A] KR 20010059367 A 20010706 - PO HANG IRON & STEEL [KR]
- [A] US 7682559 B2 20100323 - HAMADA JUNICHI [JP], et al
- [A] WO 2014157576 A1 20141002 - NIPPON STEEL & SUMIKIN SST [JP] & EP 2980251 A1 20160203 - NIPPON STEEL & SUMIKIN SST [JP]
- [A] JP 3705391 B2 20051012
- [A] SIM G M ET AL: "Effect of Nb precipitate coarsening on the high temperature strength in Nb containing ferritic stainless steels", MATERIALS SCIENCE AND ENGINEERING: A, ELSEVIER, AMSTERDAM, NL, vol. 396, no. 1-2, 15 April 2005 (2005-04-15), pages 159 - 165, XP027790738, ISSN: 0921-5093, [retrieved on 20050415]
- [A] MANTEL M ET AL: "EFFECT OF NIOBIUM ADDITIONS ON THE RECRYSTALLIZATION OF A 17% CHROMIUM FERRITIC STAINLESS STEEL", MEMOIRES ET ETUDES SCIENTIFIQUES DE LA REVUE DE METALLURGIE, REVUE DE METALLURGIE. PARIS, FR, vol. 86, no. 6, 1 June 1989 (1989-06-01), pages 382 - 390, XP000053121, ISSN: 0245-8292
- [A] SAARA MEHTONEN ET AL: "Microstructural and Texture Development during Multi-Pass Hot Deformation of a Stabilized High-Chromium Ferritic Stainless Steel", ISIJ INTERNATIONAL, vol. 54, no. 6, 1 January 2014 (2014-01-01), JP, pages 1406 - 1415, XP055591435, ISSN: 0915-1559, DOI: 10.2355/isijinternational.54.1406
- [A] NOBUHIRO FUJITA ET AL: "Changes of microstructures and high temperature properties during high temperature service of Niobium added ferritic stainless steels", MATERIALS SCIENCE AND ENGINEERING: A, vol. 351, no. 1-2, 1 June 2003 (2003-06-01), AMSTERDAM, NL, pages 272 - 281, XP055256811, ISSN: 0921-5093, DOI: 10.1016/S0921-5093(02)00831-6
- [T] SRBISLAV ALEKSANDROVIĆ ET AL: "Variation of Normal Anisotropy Ratio "r" during Plastic Forming", JOURNAL OF MECHANICAL ENGINEERING 55(2009)6, 1 January 2009 (2009-01-01), pages 392 - 399, XP055709152, Retrieved from the Internet <URL:https://www.sv-jme.eu/?ns_articles_pdf=/ns_articles/files/ojs3/1592/submission/1592-1-2-20171103.pdf&id=4959> [retrieved on 20200626]
- [A] SELLO M P ET AL: "Laves phase precipitation and its transformation kinetics in the ferritic stainless steel type AISI 441", MATERIALS SCIENCE AND ENGINEERING: A, ELSEVIER, AMSTERDAM, NL, vol. 528, no. 3, 25 January 2011 (2011-01-25), pages 1840 - 1847, XP027561746, ISSN: 0921-5093, [retrieved on 20101031]

Designated contracting state (EPC)

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

DOCDB simple family (publication)

EP 3388542 A1 20181017; EP 3388542 A4 20191106; CA 3009133 A1 20170810; CN 108495944 A 20180904; CN 108495944 B 20201225; EP 3708690 A1 20200916; JP 6383503 B2 20180829; JP WO2017135240 A1 20180208; KR 102267129 B1 20210618;

KR 20180109865 A 20181008; MX 2018009402 A 20181219; RU 2712668 C1 20200130; TW 201732055 A 20170916; TW I707049 B 20201011;
US 2018363089 A1 20181220; US 2020255919 A1 20200813; WO 2017135240 A1 20170810

DOCDB simple family (application)

EP 17747396 A 20170131; CA 3009133 A 20170131; CN 201780007794 A 20170131; EP 20171581 A 20170131; JP 2017003379 W 20170131;
JP 2017549433 A 20170131; KR 20187018664 A 20170131; MX 2018009402 A 20170131; RU 2018119752 A 20170131;
TW 106103476 A 20170202; US 201716061159 A 20170131; US 202016845327 A 20200410