

Title (en)

HOT-ROLLED STEEL SHEET, FORGED STEEL PART AND PRODUCTION METHODS THEREFOR

Title (de)

WARMGEWALZTES STAHLBLECH, STAHLBLECHTEIL UND HERSTELLUNGSVERFAHREN DAFÜR

Title (fr)

TÔLE D'ACIER LAMINÉE À CHAUD, PIÈCE EN ACIER FORGÉ ET PROCÉDÉS DE PRODUCTION ASSOCIÉS

Publication

**EP 3604583 A4 20200902 (EN)**

Application

**EP 17903376 A 20170331**

Priority

JP 2017013747 W 20170331

Abstract (en)

[origin: EP3604583A1] A hot rolled steel sheet having a chemical composition consisting of, in mass %, C: 0.020-0.070%, Si: 0.05-1.70%, Mn: 0.60-2.50%, Al: 0.010-1.000%, N: > 0-0.0030%, P ≤ 0.050%, S ≤ 0.005%, Ti: 0.015-0.170%, Nb: 0-0.100%, V: 0-0.300%, Cu: 0-2.00%, Ni: 0-2.00%, Cr: 0-2.00%, Mo: 0-1.00%, B: 0-0.0100%, Mg: 0-0.0100%, Ca: 0-0.0100%, REM: 0-0.1000%, Zr: 0-1.000%, Co: 0-1.000%, Zn: 0-1.000%, W: 0-1.000%, Sn: 0-0.050%, the balance: Fe and impurities, a metal microstructure includes, in area %, ferrite: 5-70%, bainite: 30-95%, retained γ ≤ 2%, martensite ≤ 2%, pearlite ≤ 1%, ferrite + bainite ≥ 95%, a number density of the precipitates in ferrite grains is  $1.0 \times 10^{16}$ - $50.0 \times 10^{16}$ /cm<sup>3</sup>, an average circle-equivalent diameter of the TiN precipitates in the steel sheet is 1.0-10.0 μm, an average of minimum distances between adjacent TiN precipitates is 10.0 μm or more, and a standard deviation of nano hardness is 1.00 GPa or less.

IPC 8 full level

**C22C 38/00** (2006.01); **C21D 1/19** (2006.01); **C21D 1/20** (2006.01); **C21D 6/00** (2006.01); **C21D 6/02** (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 38/04** (2006.01); **C22C 38/06** (2006.01); **C22C 38/12** (2006.01); **C22C 38/14** (2006.01); **C22C 38/16** (2006.01); **C22C 38/18** (2006.01)

CPC (source: EP KR US)

**C21D 1/19** (2013.01 - EP); **C21D 1/20** (2013.01 - EP); **C21D 6/008** (2013.01 - EP); **C21D 6/02** (2013.01 - EP); **C21D 8/005** (2013.01 - US); **C21D 8/0226** (2013.01 - EP US); **C21D 8/0263** (2013.01 - EP); **C21D 8/0426** (2013.01 - EP); **C21D 8/0463** (2013.01 - EP); **C21D 9/46** (2013.01 - EP KR); **C21D 9/48** (2013.01 - EP); **C22C 38/002** (2013.01 - US); **C22C 38/005** (2013.01 - US); **C22C 38/02** (2013.01 - EP); **C22C 38/04** (2013.01 - EP); **C22C 38/06** (2013.01 - EP); **C22C 38/14** (2013.01 - EP); **C22C 38/42** (2013.01 - KR US); **C22C 38/44** (2013.01 - KR US); **C22C 38/46** (2013.01 - US); **C22C 38/48** (2013.01 - US); **C22C 38/50** (2013.01 - US); **C22C 38/54** (2013.01 - US); **C22C 38/58** (2013.01 - KR US); **C21D 2211/001** (2013.01 - US); **C21D 2211/002** (2013.01 - EP US); **C21D 2211/005** (2013.01 - EP US); **C21D 2211/008** (2013.01 - US); **C21D 2211/009** (2013.01 - US); **C22C 38/002** (2013.01 - EP); **C22C 38/005** (2013.01 - EP); **C22C 38/12** (2013.01 - EP); **C22C 38/16** (2013.01 - EP); **C22C 38/18** (2013.01 - EP)

Citation (search report)

- [A] EP 2987884 A1 20160224 - NIPPON STEEL & SUMITOMO METAL CORP [JP]
- [A] EP 2243851 A1 20101027 - JFE STEEL CORP [JP]
- [A] JP 2005314798 A 20051110 - JFE STEEL KK
- See references of WO 2018179389A1

Cited by

RU2765046C1

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 3604583 A1 20200205**; **EP 3604583 A4 20200902**; BR 112019019317 A2 20200414; CN 110475889 A 20191119; JP 6332570 B1 20180530; JP WO2018179389 A1 20190404; KR 20190131086 A 20191125; MX 2019011709 A 20191121; US 2021095363 A1 20210401; WO 2018179389 A1 20181004

DOCDB simple family (application)

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