

Title (en)

MEDIUM-MANGANESE STEEL PRODUCT FOR LOW-TEMPERATURE USE AND METHOD FOR THE PRODUCTION THEREOF

Title (de)

MITTELMANGANSTAHLPRODUKT ZUM TIEFTEMPERATUREINSATZ UND VERFAHREN ZU SEINER HERSTELLUNG

Title (fr)

PRODUIT EN ACIER AU MANGANÈSE MOYEN POUR UTILISATION À BASSE TEMPÉRATURE ET SON PROCÉDÉ DE FABRICATION

Publication

**EP 3535431 A1 20190911 (DE)**

Application

**EP 17798132 A 20171027**

Priority

- DE 102016120895 A 20161102
- EP 2017077628 W 20171027

Abstract (en)

[origin: WO2018083035A1] The invention relates to a steel product for low-temperature use having a minimum notch impact work at -196 °C in the transverse direction of  $\geq 50$  J/cm<sup>2</sup>, having the following chemical composition in wt%: C: 0.01 to < 0.3, preferably 0.03 to 0.15; Mn: 4 to < 10, preferably 4 to < 8; Al: 0.003 to 2.9, preferably 0.03 to 0.4; Mo: 0.01 to 0.8, preferably 0.1 to 0.5; Si: 0.02 to 0.8, preferably 0.08 to 0.3; Ni: 0.005 to 3, preferably 0.01 to 3; P: < 0.04; S: < 0.02; N: < 0.02; remainder iron including unavoidable steel-accompanying elements, wherein for the alloy composition the equation  $6 < 1.5 \text{ Mn} + \text{Ni} < 8$  is satisfied, with optional addition of one or more of the following elements: Ti, V, Cr, Cu, Nb, B, Co, W, Zr, Ca, and Sn, or for the alloy composition, the equation  $0.11 < \text{C} + \text{Al} < 3$  is satisfied, with the optional addition of one or more of the following elements: Ti, V, Cr, Cu, Nb, B, Co, W, Zr, Ca, and Sn, or the alloy composition, in addition to Ni, contains one or more of the elements B, V, Nb, Co, W, or Zr, with the optional addition of one or more of the following elements: Ti, Cr, Cu, Ca, and Sn, having a structure comprising 2 to 90 % by volume of austenite, less than 40 % by volume of ferrite and/or bainite and the rest martensite. Said steel product can be produced economically and exhibits an advantageous combination of strength and strain properties at low temperatures and, optionally, a TRIP and/or TWIP effect. The invention further relates to a method for producing a steel product in the form of a flat steel product or a seamless tube.

IPC 8 full level

**C22C 38/00** (2006.01); **B21C 1/00** (2006.01); **C21D 6/00** (2006.01); **C21D 8/00** (2006.01); **C21D 8/02** (2006.01); **C21D 8/10** (2006.01); **C21D 9/08** (2006.01); **C21D 9/46** (2006.01); **C22C 38/02** (2006.01); **C22C 38/04** (2006.01); **C22C 38/06** (2006.01); **C22C 38/08** (2006.01); **C22C 38/10** (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 RU US)

**B21C 1/00** (2013.01 - RU); **C21D 1/26** (2013.01 - EP KR US); **C21D 6/005** (2013.01 - EP KR US); **C21D 8/02** (2013.01 - RU); **C21D 8/0226** (2013.01 - EP KR); **C21D 8/0236** (2013.01 - EP KR); **C21D 8/0263** (2013.01 - EP KR); **C21D 8/10** (2013.01 - RU); **C21D 8/105** (2013.01 - US); **C21D 9/08** (2013.01 - US); **C21D 9/46** (2013.01 - US); **C22C 38/00** (2013.01 - EP US); **C22C 38/001** (2013.01 - US); **C22C 38/002** (2013.01 - US); **C22C 38/008** (2013.01 - 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 38/08** (2013.01 - EP KR US); **C22C 38/105** (2013.01 - EP KR US); **C22C 38/12** (2013.01 - EP KR RU US); **C22C 38/14** (2013.01 - EP KR US); **C22C 38/16** (2013.01 - EP KR US); **C22C 38/18** (2013.01 - EP KR US); **C22C 38/20** (2013.01 - EP KR US); **C22C 38/22** (2013.01 - EP KR US); **C22C 38/30** (2013.01 - EP KR US); **C22C 38/42** (2013.01 - US); **C22C 38/44** (2013.01 - US); **C22C 38/46** (2013.01 - US); **C22C 38/48** (2013.01 - US); **C22C 38/50** (2013.01 - US); **C22C 38/52** (2013.01 - US); **C22C 38/54** (2013.01 - US); **C22C 38/58** (2013.01 - RU US); **B21C 37/08** (2013.01 - EP US); **B21C 37/122** (2013.01 - EP US); **C21D 8/0205** (2013.01 - US); **C21D 8/0226** (2013.01 - US); **C21D 8/0236** (2013.01 - US); **C21D 8/0247** (2013.01 - EP US); **C21D 8/0263** (2013.01 - US); **C21D 8/0278** (2013.01 - EP US); **C21D 8/10** (2013.01 - EP US); **C21D 9/08** (2013.01 - EP); **C21D 9/46** (2013.01 - EP); **C21D 2201/02** (2013.01 - EP US); **C21D 2211/001** (2013.01 - EP US); **C21D 2211/002** (2013.01 - EP US); **C21D 2211/005** (2013.01 - EP US); **C21D 2211/008** (2013.01 - EP US)

Citation (search report)

See references of WO 2018083035A1

Cited by

EP4299768A1

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

Designated extension state (EPC)

BA ME

DOCDB simple family (publication)

**WO 2018083035 A1 20180511**; AU 2017353259 A1 20190509; AU 2017353259 B2 20221222; CA 3042120 A1 20180511; CA 3042120 C 20220809; CN 109923233 A 20190621; DK 3535431 T3 20210816; EP 3535431 A1 20190911; EP 3535431 B1 20210609; JP 2020500262 A 20200109; KR 20190082804 A 20190710; RU 2728054 C1 20200728; US 11352679 B2 20220607; US 2019264297 A1 20190829

DOCDB simple family (application)

**EP 2017077628 W 20171027**; AU 2017353259 A 20171027; CA 3042120 A 20171027; CN 201780067719 A 20171027; DK 17798132 T 20171027; EP 17798132 A 20171027; JP 2019522842 A 20171027; KR 20197014457 A 20171027; RU 2019116309 A 20171027; US 201716346761 A 20171027