Title (en)

Cold rolled steel flat product and method for its production

Title (de)

Kaltgewalztes Stahlflachprodukt und Verfahren zu seiner Herstellung

Title (fr)

Produit plat en acier laminé à froid et son procédé de fabrication

Publication

EP 2684975 A1 20140115 (DE)

Application

EP 12175756 A 20120710

Priority

EP 12175756 A 20120710

Abstract (en)

Cold reduced flat steel product comprises perlite and bainite structure comprising 20-40 vol.% of martensite, 2-15 vol.% of retained austenite and residual ferrite. The flat steel product is made of a steel consisting of 0.12-0.19 wt.% of carbon, 1.5-2.5 wt.% of manganese, 0.60-1 wt.% of silicon, = 0.1 wt. of aluminum, 0.2-0.6 wt.% of chromium, 0.05-0.15 wt.% of titanium, and remaining iron and unavoidable impurities, and has an elongation at rupture (A80) of 15%, a tensile strength of at least 880 MPa, a yield strength of at least 550 MPa, and hole expansion ratio of more than 6%. An independent claim is included for producing the cold-rolled flat steel product comprising Casting a steel melt containing of carbon, manganese, silicon, aluminum, chromium, titanium and remaining iron and unavoidable impurities to form an intermediate in which there is a slab or thin slab, heating the intermediate at an austenitizing temperature of 1100-1300[deg] C, hot rolling the heated intermediate to form a hot strip at a temperature of 850-960[deg] C, cooling the hot strip at a coiling temperature of 500-650[deg] C, rolling the cooled strip using a roller, optionally pickling the hot-rolled strip, cold-rolling the hot-rolled strip into a cold-rolled flat steel product having cold rolling ratio of at least 30%, continuously annealing the cold-rolled steel flat product at a temperature of 750-900[deg] C for 80-300 seconds, and then cooling in two stages, aging the flat steel product at an aging temperature of 100-400[deg] C for 210-710 seconds, cooling the flat product to room temperature, temper-rolling the flat steel product with a roll of 0.2-2%, and optional coating the flat steel product with a metallic protective layer, where the step of cooling the cold-rolled steel flat product includes in the first stage, cooling the product with a cooling rate of 8-100[deg] C/sec to a temperature of 450-550[deg] C and in the second stage, cooling from the intermediate temperature at a cooling rate of 2-100[deg] K/second to a temperature of 350-450[deg] C.

Abstract (de)

Die Erfindung betrifft ein kaltgewalztes Stahlflachprodukt, das trotz hoher Festigkeitswerte eine durch eine hohe Bruchdehnung und ein gutes Lochaufweitungsverhältnis » M gekennzeichnete Verformbarkeit besitzt. Dazu ist das Stahlflachprodukt aus einem Stahl hergestellt ist, der aus (in Gew.-%) C: 0,12 - 0,19 %, Mn: 1,5 - 2,5 %, Si: >0,60 - 1,0 %, Al : #¤ 0,1 %, Cr: 0,2 - 0,6 %, Ti: 0,05 - 0,15 % und als Rest aus Eisen sowie herstellungsbedingt unvermeidbaren Verunreinigungen besteht, und weist ein perlit- und bainitfreies Gefüge mit 4 - 20 Vol. -% Martensit, 2 - 15 Vol.-% Restaustenit, Rest Ferrit, eine Bruchdehnung A80 von mindestens 15 %, eine Zugfestigkeit Rm von mindestens 880 MPa, eine Streckgrenze ReL von mindestens 550 MPa und ein Lochaufweitungsverhältnis » M von mehr als 6 % auf. Ebenso betrifft die Erfindung ein Verfahren, das auf einfache Weise die Herstellung eines erfindungsgemäßen Stahlflachprodukts ermöglicht.

IPC 8 full level

C21D 9/46 (2006.01); **C21D 8/02** (2006.01); **C22C 38/00** (2006.01); **C22C 38/02** (2006.01); **C22C 38/06** (2006.01); **C22C 38/28** (2006.01); **C22C 38/38** (2006.01)

CPC (source: EP KR US)

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