

Title (en)

STEEL MATERIAL FOR OIL WELL, AND OIL WELL PIPE

Title (de)

STAHLMATERIAL FÜR ÖLBOHRUNG UND ÖLBOHRUNGSROHR

Title (fr)

MATÉRIAU D'ACIER POUR Puits DE PÉTROLE, ET CONDUITE DE Puits DE PÉTROLE

Publication

EP 4101938 A1 20221214 (EN)

Application

EP 20917604 A 20201217

Priority

- JP 2020016604 A 20200203
- JP 2020047181 W 20201217

Abstract (en)

A steel was developed with a chemical composition consisting of (mass%) C (0.60-2.00%), Si (0.01-3.00%), Mn (16.0-30.0%), Al (0.07-6.00%), V (0.50-3.00%), N (0.500% or less), P (0.030% or less), S (0.030% or less), Cr (0-10.00%), Mo (0-3.00%), Cu (0-3.00%), Ni (0-20.00%), Ti (0-3.00%), Nb (0-3.00%), Zr (0-3.00%), Ta (0-6.00%), Hf (0-6.00%), W (0-6.00%), Ca (0-0.0050%), Mg (0-0.0050%), and B (0-0.0150%), with the balance being Fe and impurities. The value in Formula (i) is between 0.55 and 1.54. In the steel microstructure, the total volume fraction of α' martensite and ferrite is less than 0.1%, the volume fraction of ε martensite, which has an HCP structure, is 10% or less, and the balance is austenite. The number density of carbonitride precipitates with an equivalent circular diameter of 5-100 nm is 100 particles/ μm^2 or more, the yield stress is 862 MPa or more, the SFE at 25°C is 30 mJ/m² or more, and the γ grain size is 100 μm or smaller.

IPC 8 full level

C21D 8/02 (2006.01); **C21D 8/10** (2006.01); **C21D 9/08** (2006.01); **C22C 38/00** (2006.01); **C22C 38/58** (2006.01)

CPC (source: EP)

C21D 1/26 (2013.01); **C21D 6/005** (2013.01); **C21D 6/02** (2013.01); **C21D 8/0205** (2013.01); **C21D 8/0226** (2013.01); **C21D 8/0247** (2013.01); **C21D 8/0263** (2013.01); **C21D 8/0273** (2013.01); **C21D 8/105** (2013.01); **C21D 9/08** (2013.01); **C21D 9/46** (2013.01); **C22C 38/001** (2013.01); **C22C 38/002** (2013.01); **C22C 38/02** (2013.01); **C22C 38/04** (2013.01); **C22C 38/06** (2013.01); **C22C 38/08** (2013.01); **C22C 38/12** (2013.01); **C22C 38/14** (2013.01); **C22C 38/16** (2013.01); **C22C 38/22** (2013.01); **C22C 38/24** (2013.01); **C22C 38/38** (2013.01); **C22C 38/46** (2013.01); **C22C 38/58** (2013.01); **C21D 2211/001** (2013.01); **C21D 2211/004** (2013.01)

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

Designated validation state (EPC)

KH MA MD TN

DOCDB simple family (publication)

EP 4101938 A1 20221214; **EP 4101938 A4 20240605**; JP 7348553 B2 20230921; JP WO2021157217 A1 20210812; WO 2021157217 A1 20210812

DOCDB simple family (application)

EP 20917604 A 20201217; JP 2020047181 W 20201217; JP 2021575644 A 20201217