

Title (en)

Steel excellent in toughness of weld heat-affected zone

Title (de)

Stahl mit durch Schweißen beeinflusster Zone mit ausgezeichneter Zähigkeit

Title (fr)

Acier présentant une excellente ténacité de la zone affectée thermiquement par soudage

Publication

**EP 1520912 A2 20050406 (EN)**

Application

**EP 04026201 A 20001113**

Priority

- EP 00974966 A 20001113
- JP 2000033241 A 20000210
- JP 2000033242 A 20000210
- JP 2000068210 A 20000313

Abstract (en)

The present invention realizes excellent HAZ toughness by further suppressing the coarsening of austenite grains when they are heated for a long time at a high temperature in order to remarkably improve HAZ properties. <??>The present invention is a steel excellent in the toughness of a weld heat-affected zone: having a specific chemical composition in mass, of C: 0.03 to 0.18%, Si: 0.5% or less, Mn: 0.4 to 2.0%, P: 0.02% or less, S: 0.02% or less, Al: 0.005 to 0.04%, Ti: 0.005 to 0.03%, Ca: 0.0005 to 0.003%, and N: 0.0005 to 0.007%, with the balance consisting of Fe and unavoidable impurities; satisfying the expression  $0 \leq EN \leq 0.002$  regarding the EN value expressed by an equivalent equation comprising (%N), (%Ti) and (%B); and containing oxide particles 0.005 to 2.0  $\mu$ m, preferably 0.1 to 2.0  $\mu$ m, in circle-equivalent diameter, which oxide particles contain at least Ca, Al and O in their composition and, in the mass percentage of the elements excluding O, contain Ca at 5% or more and Al at 5% or more with the balance consisting of other deoxidizing elements and/or unavoidable impurities, with the density of the oxide particles being 100 to 3,000 pieces/mm<sup>2</sup>.

IPC 1-7

**C22C 38/00**; **C22C 38/04**

IPC 8 full level

**C22C 38/00** (2006.01); **C22C 38/02** (2006.01); **C22C 38/04** (2006.01); **C22C 38/06** (2006.01); **C22C 38/14** (2006.01)

CPC (source: EP KR)

**C22C 38/00** (2013.01 - KR); **C22C 38/002** (2013.01 - EP); **C22C 38/02** (2013.01 - EP); **C22C 38/04** (2013.01 - EP); **C22C 38/06** (2013.01 - EP); **C22C 38/14** (2013.01 - EP)

Cited by

CN103649355A; WO2013007729A1

Designated contracting state (EPC)

DE FR

DOCDB simple family (publication)

**EP 1262571 A1 20021204**; **EP 1262571 A4 20030326**; **EP 1262571 B1 20050810**; DE 60021919 D1 20050915; DE 60021919 T2 20060608; DE 60033070 D1 20070308; DE 60033070 T2 20070531; EP 1520912 A2 20050406; EP 1520912 A3 20050427; EP 1520912 B1 20070117; KR 100514667 B1 20050914; KR 20020073579 A 20020927; WO 0159167 A1 20010816

DOCDB simple family (application)

**EP 00974966 A 20001113**; DE 60021919 T 20001113; DE 60033070 T 20001113; EP 04026201 A 20001113; JP 0007999 W 20001113; KR 20027010139 A 20020806