

Title (en)  
RAIL STEEL WITH AN EXCELLENT COMBINATION OF WEAR PROPERTIES, ROLLING CONTACT FATIGUE RESISTANCE AND WELDABILITY

Title (de)  
SCHIENENSTAHL MIT HERVORRAGENDER KOMBINATION AUS VERSCHLEISSEIGENSCHAFTEN, ERMÜDUNGSBESTÄNDIGKEIT UND SCHWEISSBARKEIT

Title (fr)  
ACIERS POUR RAILS AVEC EXCELLENTE COMBINAISON DE PROPRIÉTÉS D'USURE, DE RÉSISTANCE À LA FATIGUE EN CONTACT ROULANT ET DE SOUDABILITÉ

Publication  
**EP 2785890 B1 20150715 (EN)**

Application  
**EP 12791480 A 20121126**

Priority  
• EP 11190973 A 20111128  
• EP 2012073606 W 20121126  
• EP 12791480 A 20121126

Abstract (en)  
[origin: WO2013079438A1] Steel for the manufacture of rails, particularly of grooved rails, having a hardness of at least 330 HV30, a tensile strength of at least 1000 MPa and a yield strength of at least 600 MPa comprising in weight %, . 0.70% to 0.85 carbon, . 0.65% to 1.00% silicon, . 1.1% to 1.4% manganese, . 0.07% to 0.15% vanadium, . up to 0.008% nitrogen, . up to 0.025% phosphorus, . 0.008 to 0.030% sulphur, . at most 2.5 ppm hydrogen, . at most 0.10% chromium, . at most 0.010% aluminium, . at most 20 ppm oxygen, . the remainder consisting of iron and unavoidable impurities.

IPC 8 full level  
**C21D 9/04** (2006.01); **C22C 38/02** (2006.01); **C22C 38/04** (2006.01); **C22C 38/12** (2006.01); **C22C 38/24** (2006.01); **C22C 38/46** (2006.01)

CPC (source: EP)  
**C22C 38/02** (2013.01); **C22C 38/04** (2013.01); **C22C 38/12** (2013.01); **C22C 38/24** (2013.01); **C22C 38/46** (2013.01); **C21D 9/04** (2013.01)

Citation (opposition)  
Opponent : voestalpine Schienen GmbH  
• EP 2006406 A1 20081224 - JFE STEEL CORP [JP]  
• US 2002011283 A1 20020131 - FUJIKAKE MASAHISA [JP], et al  
• EP 0469560 A1 19920205 - BURLINGTON NORTHERN RAILROAD [US], et al  
• US 4767475 A 19880830 - FUKUDA KOZO [JP], et al  
• JP S6324045 A 19880201 - NIPPON KOKAN KK  
• JP H06279928 A 19941004 - NIPPON STEEL CORP  
• JP H06340951 A 19941213 - NIPPON STEEL CORP  
• WO 2009103565 A1 20090827 - CORUS UK LTD [GB], et al  
• EP 0136741 A1 19850410 - KOLBENSCHMIDT AG [DE]  
• GB 2443494 A 20080507 - CORUS UK LTD [GB]  
• HIROYASU YOKOYAMA ET AL.: "High Strength Bainitic Steel Rails for Heavy Haul Railways with Superior Damage Resistance", NKK TECHNICAL REVIEW, no. 84, July 2001 (2001-07-01), pages 44 - 51, XP055290755

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