

## Title (en)

Ferritic heat-resistant steel and method for producing it

## Title (de)

Ferritischer, wärmebeständiger Stahl und Verfahren zur Herstellung

## Title (fr)

Acier ferritique réfractaire et procédé de fabrication

## Publication

**EP 0903421 A1 19990324 (EN)**

## Application

**EP 98307629 A 19980921**

## Priority

- JP 25647997 A 19970922
- JP 25648097 A 19970922
- JP 25648197 A 19970922

## Abstract (en)

The invention provides a ferritic heat-resistant steel having excellent high-temperature oxidation resistance, especially excellent steam oxidation-resistant characteristics. In high-Cr ferritic heat-resistant steel, ultra-fine oxide particles having a size of not larger than 1  $\mu\text{m}$  are formed just below the oxide films and formed on the steel base, whereby the adhesiveness between the films and the base is enhanced. The ferritic heat-resistant steel consists of: C from 0.02 to 0.18%, Si up to 1.0%, Mn up to 1.5%, P up to 0.030%, S up to 0.015%, Cr from 8.0 to 13.0%, Mo up to 2%, W up to 4%, with  $W + 2Mo \leq 4\%$ , V from 0.10 to 0.50%, Nb from 0.02 to 0.14% either Ti and/or Y, with  $0.01 \leq Ti + Y \leq 0.30\%$  either Rh and/or Ir, with  $0.3\% \leq Rh + (1/2)Ir \leq 5\%$  either Pd and/or Pt in a total amount between 0.3 and 5% balance Fe

## IPC 1-7

**C22C 38/24**; **C22C 38/26**; **C22C 38/22**

## IPC 8 full level

**C21D 1/18** (2006.01); **C21D 8/00** (2006.01); **C22C 38/00** (2006.01); **C22C 38/22** (2006.01); **C22C 38/24** (2006.01); **C22C 38/26** (2006.01); **C21D 1/28** (2006.01); **C21D 8/02** (2006.01)

## CPC (source: EP US)

**C21D 1/18** (2013.01 - EP US); **C21D 6/002** (2013.01 - EP US); **C21D 8/005** (2013.01 - EP US); **C22C 38/002** (2013.01 - EP US); **C22C 38/005** (2013.01 - EP US); **C22C 38/04** (2013.01 - EP US); **C22C 38/22** (2013.01 - EP US); **C22C 38/24** (2013.01 - EP US); **C22C 38/26** (2013.01 - EP US); **C22C 38/28** (2013.01 - EP US); **F28F 19/06** (2013.01 - EP US); **C21D 1/28** (2013.01 - EP US); **C21D 8/0205** (2013.01 - EP US); **C21D 2211/005** (2013.01 - EP US)

## Citation (search report)

- [X] DE 3130179 A1 19820318 - NIPPON STEEL CORP [JP]
- [X] EP 0384433 A1 19900829 - HITACHI METALS LTD [JP]
- [A] EP 0199046 A1 19861029 - NIPPON STEEL CORP [JP]
- [A] DE 2042394 A1 19710325 - NIPPON KOKAN KK
- [A] PATENT ABSTRACTS OF JAPAN vol. 15, no. 197 (C - 0833) 21 May 1991 (1991-05-21)
- [A] PATENT ABSTRACTS OF JAPAN vol. 18, no. 251 (C - 1199) 13 May 1994 (1994-05-13)
- [A] PATENT ABSTRACTS OF JAPAN vol. 13, no. 208 (C - 596) 16 May 1989 (1989-05-16)
- [A] PATENT ABSTRACTS OF JAPAN vol. 17, no. 216 (C - 1053) 28 April 1993 (1993-04-28)

## Cited by

FR3014906A1; EP1557477A4; DE19941411B4; WO2015087021A1

## Designated contracting state (EPC)

BE DE

## DOCDB simple family (publication)

**EP 0903421 A1 19990324**; **EP 0903421 B1 20041124**; DE 69827729 D1 20041230; DE 69827729 T2 20050428; DE 69829012 D1 20050317; DE 69829012 T2 20050707; DE 69837055 D1 20070322; DE 69837055 T2 20071108; EP 1329531 A2 20030723; EP 1329531 A3 20030730; EP 1329531 B1 20070207; EP 1329531 B8 20070919; EP 1329532 A2 20030723; EP 1329532 A3 20030730; EP 1329532 B1 20050209; EP 1329532 B8 20070919; US 2002011285 A1 20020131; US 2003127163 A1 20030710; US 2004060621 A1 20040401; US 2006054253 A1 20060316

## DOCDB simple family (application)

**EP 98307629 A 19980921**; DE 69827729 T 19980921; DE 69829012 T 19980921; DE 69837055 T 19980921; EP 03007332 A 19980921; EP 03007333 A 19980921; US 15739298 A 19980921; US 19903102 A 20020722; US 25049205 A 20051017; US 67387903 A 20030930