

Title (en)
HEAT-RESISTANT STEEL AND GAS TURBINE MADE OF THE SAME

Publication
EP 0298127 A4 19930526 (EN)

Application
EP 88900787 A 19880106

Priority
• JP 163087 A 19870109
• JP 8800007 W 19880106

Abstract (en)
[origin: EP0298127A1] This new heat-resistant steel has the following component compsn. (1) C (0.05-0.2 wt.%), Si (0.5 wt.% or less), Mn (0.6 wt.% or less), Cr (8-13 wt.%, Mo (1.5-3 wt.%), Ni (2-3 wt.%), V (0.05-0.3 wt.%), Nb and/or Ta (total amount : 0.02-2.0 wt.%), N (0.02-0.1 wt.%), Fe (the remaining wt.%), Mn/Ni is not more than 0.11 (2) C (0.07-0.15 wt.%), Si (0.01 or 0.1 wt.%), Mn (0.1-0.4 wt.%), Cr (11-12.5 wt.%), Ni (2.2-3.0 wt.%), Mo (1.8-2.5 wt.%), Nb and/or Ta (total amount: 0.04 - 0.08 wt.%), Fe (the remaining wt.%), Mn/Ni = 0.04-0.10 (3) C (0.05-0.2 wt.%), Si (0.5 wt.% or less), Mn (0.6 wt.% or less), Cr (8-13 wt.%), Mo (1.5-3 wt.%), Ni (2-3 wt.%), V (0.05-0.3 wt.%), Nb and/or Ta (total amount : 0.02-0.2 wt.%), N (0.02-0.1 wt.%), W (1 wt.% or less), Co (0.5 wt.% or less), Cu (0.5 wt.% or less), B (0.01 wt.% or less), Ti (0.5 wt.% or less), Al (0.3 wt.% or less), Zr (0.1 wt.% or less), Hf (0.1 wt.% or less), Ca (0.01 wt.% or less), Mg (0.01 wt.% or less), Y (0.01 wt.% or less), rare earth elements (0.01 wt.% or less), Fe (the remaining wt.%). (1) has characteristics such as creep rupture strength of at least 50 kg/mm² at 450 deg. C for 105 hours and a 25 V-notch Charpy impact value of at least 5 Kg/m/cm² after heat treatment at 500 deg. C for 103 hours. Compsn. (2) has the annealed martensite structure. This heat-resistant steel is used for the turbine discs of a gas turbine which consists of a turbine shaft, a number of turbine discs, a number of compression discs connected to the distant pieces by compressor stacking bolts, compressor blades implanted in the compressor discs and a compressor stub shaft shaped integrally at the initial stage of the compressor disc.

IPC 1-7
C22C 19/05; C22C 19/07; C22C 38/46; C22C 38/48; C22C 38/50; C22C 38/54; F01D 5/00

IPC 8 full level
C22C 38/00 (2006.01); **C22C 19/05** (2006.01); **C22C 19/07** (2006.01); **C22C 38/46** (2006.01); **C22C 38/48** (2006.01); **C22C 38/54** (2006.01); **F01D 5/00** (2006.01); **F01D 5/06** (2006.01); **F01D 5/28** (2006.01)

CPC (source: EP KR)
C22C 19/05 (2013.01 - KR); **C22C 19/055** (2013.01 - EP); **C22C 19/056** (2013.01 - EP); **C22C 19/07** (2013.01 - EP); **C22C 38/46** (2013.01 - EP); **F01D 5/28** (2013.01 - EP); **F05D 2200/11** (2013.01 - EP)

Citation (search report)
• FR 2011320 A1 19700227 - FIRTH BROWN LTD
• US 964003 A 19100712 - DOUGLAS HAMMOND B [US]
• FR 2406121 A1 19790511 - GEN ELECTRIC [US]
• US 4453889 A 19840612 - SAKATA SOOJI [JP], et al
• US 3061487 A 19621030 - JOSEPH MELILL, et al
• FR 2475577 A1 19810814 - JAPAN CASTING FORGING CORP [JP]
• US 3344000 A 19670926 - BALDY MAURICE F, et al
• DE 1950004 A1 19710422 - SUEDEWESTFALEN AG STAHLWERKE
• US 2968549 A 19610117 - BRADY RICHARD R, et al
• LU 53940 A1 19670822
• SU 345230 A1 19720714
• US 3912553 A 19751014 - WARD GEORGE M, et al
• DE 3326544 A1 19850207 - HITACHI LTD [JP]
• US 2703277 A 19550301 - SPENDELOW JR HOWARD R, et al
• EP 0178334 A1 19860423 - KAWASAKI STEEL CO [JP]
• US 3778316 A 19731211 - PINNOW K, et al
• US 4080202 A 19780321 - FUKUI YUTAKA, et al
• US 4437913 A 19840320 - FUKUI YUTAKA [JP], et al
• FR 2345525 A1 19771021 - INCO EUROP LTD [GB]
• METAL PROGRESS, vol. 120, mid-June 1981, pages 46-49, Am. Soc. for Metals, Metals Park, Ohio, US; "Standard stainless and heat resisting steels"
• G.W. MEETHAM: "The Development of Gas Turbine Materials", 1981, Applied Science Publishers Ltd, London, GB
• METAL PROGRESS, vol. 120, mid-June 1981, pages 90-91, Am. Soc. for Metals, Metals Park, Ohio, US; "Cobalt-base alloys"
• C.W. WEGST: "Stahlschlüssel", 13th edition, 1983, page 350, Verlag Stahlschlüssel Wegst GmbH, Marbach, DE
• See references of WO 8805086A1

Cited by
EP0759499A1; CN105648356A; CN117305726A; US6074169A; US5749228A; US6123504A; EP0384181A3; EP0831203A3; EP0881360A4; US6182439B1; US6174132B1; WO9739158A1

Designated contracting state (EPC)
CH IT LI

DOCDB simple family (publication)
EP 0298127 A1 19890111; EP 0298127 A4 19930526; EP 0298127 B1 19960731; CN 1036666 C 19971210; CN 88100065 A 19881005; JP H0563544 B2 19930910; JP S63171856 A 19880715; KR 890700690 A 19890426; KR 950009221 B1 19950818; KR 950014312 B1 19951124; WO 8805086 A1 19880714

DOCDB simple family (application)
EP 88900787 A 19880106; CN 88100065 A 19880109; JP 163087 A 19870109; JP 8800007 W 19880106; KR 19950702931 A 19950718; KR 880701093 A 19880908