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SUPPLEMENTARY EUROPEAN SEARCH REPORT

Application Number
EP 09 73 2579

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	WO 2007/063581 A1 (SUMITOMO METAL IND [JP]; FUJIMURA HIROSHI [JP]; YASHIKI HIROYOSHI [JP]) 7 June 2007 (2007-06-07) * abstract * * paragraphs [0025] - [0027]; example B; table 1 * * paragraphs [0056] - [0057] * * pages 17-20, paragraph 0074; example 1; tables 2,3 * -----	1,2,5,6, 9-12 3,4,7,8	INV. C22C38/00 C21D8/12 C21D9/46 C22C38/16 H01F1/16 C22C38/04 C22C38/06 C22C38/08 C22C38/02
X	EP 1 580 289 A1 (JFE STEEL CORP [JP]) 28 September 2005 (2005-09-28) * abstract * * paragraph [0036] - paragraph [0059] * * paragraph [0062] * * page 18; example 25; table 1 * * paragraph [0095] * * paragraph [0111] * * claims 1,6 * -----	1-12	C22C38/12 C22C38/14 H01F1/147
A	JP 2007 162097 A (SUMITOMO METAL IND) 28 June 2007 (2007-06-28) * abstract * * paragraph [0057] * * example M; table 2 * * paragraph [0083] * * paragraph [0095] * -----	1-12	TECHNICAL FIELDS SEARCHED (IPC) C22C C21D
A	EP 1 679 386 A1 (NIPPON STEEL CORP [JP]) 12 July 2006 (2006-07-12) * abstract * * paragraph [0015] - paragraph [0029] * * page 10; examples 1- No.9; table 1 * * paragraph [0049]; claim 20 * * examples 1,3,4 * ----- -/--	1-12	

The supplementary search report has been based on the last set of claims valid and available at the start of the search.

Place of search	Date of completion of the search	Examiner
The Hague	14 December 2016	Ugarte, Eva

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	JP 2004 084053 A (NIPPON STEEL CORP) 18 March 2004 (2004-03-18) * abstract * * paragraph [0043] * * page 12, paragraph 0070; examples 1-St7; table 1 * * page 19, paragraph 82; examples 4-St42; table 7 * * paragraphs [0057], [0062]; claim 18 * -----	1-12	

TECHNICAL FIELDS SEARCHED (IPC)

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Place of search	Date of completion of the search	Examiner
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Application Number

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present (supplementary) European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present (supplementary) European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present (supplementary) European search report has been drawn up for those parts of the European patent application which relate to the first mentioned in the claims, namely claims:

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 09 73 2579

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 9, 10(completely); 1-8(partially)

   High strength non-oriented electrical steel sheet containing (mass%), C: 0.002- 0.05; Si 2.0-4.0; Mn 0.05-1.0; N 0.002-0.05; Cu 0.5-3.0; Al<3.0, balance Fe and inevitable impurities. Form (1) and (2) are satisfied: (1) 2.0x10^-4< Nb/93+Zr/91+Ti/48 + V/51 and (2) 1.0x10^-3< C/12 + N/14 - (Nb/93+Zr/91+Ti/48+V/51)<3.0x10^-3
   Recrystallization area ratio > 50%; YS yield stress > 700 MPa; Fracture elongation >10%, Eddy current loss (W/kg) satisfies (3) We 10/400 < 70x t^2 (t= thickness, mm, of the sheet).
   Method to produce said steel sheet, comprising A. slab of composition, B. Hot rolling, C. Pickling, D. Cold rolling, E. Finish anneal with soaking temperature T satisfying (4) T>200* a + 500, where a=Cu content in the cold-rolled sheet.
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2. claims: 11(completely); 1-8(partially)

   A high-strength non-oriented electrical steel sheet, as for group 1 and additionally a ductile/brittle fracture transition temperature at a Charpy impact test of the hot-rolled sheet is 70°C or less.
   Method as for Invention 1 but no soaking temp and form(4) and wherein a Hot rolling with COILING temperature <550degC
   ---

3. claims: 12(completely); 1-8(partially)

   A high-strength non-oriented electrical steel sheet, as for group 1 and additionally a ductile/brittle fracture transition temperature at a Charpy impact test of the hot-rolled sheet is 70°C or less.
   Method as for Invention 1 but no soaking temp and form(4) and wherein COOLING RATE from 900 to 500 deg C after annealing is >50 degC/sec
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 73 2579

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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14-12-2016

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