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(54) **Wire rod having excellent wire drawability and its production method**

(57) A wire rod, whose tensile strength after wire drawing becomes more or less 3,000 MPa, which does not cause wire breakage even if wire drawing speed is increased, which does not shorten the life time of a dice, and whose wire drawability is improved, contains C: 0.65-0.75%, Si: 0.1-0.5%, Mn: 0.1-0.6%, P: 0.015% or below (not including 0%), S: 0.015% or below (not includ-

ing 0%), N: 0.004% or below (not including 0%), Al: 0.003% or below (not including 0%), O: 0.003% or below (not including 0%), the balance being iron and inevitable impurities, tensile strength (TS) being 960 MPa or below, and reduction of area (RA) being 40% or above.

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EUROPEAN SEARCH REPORT

Application Number
EP 08 01 4230

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	EP 1 674 588 A1 (KOBE STEEL LTD [JP]) 28 June 2006 (2006-06-28) * claims 1-10 * * examples 1-2; tables 1-8 * * paragraph [0015] - paragraph [0061] * -----	1-5	INV. C22C38/02 C22C38/04 C21D8/06 C22C38/00 C21D9/52
X	EP 1 018 565 A1 (SUMITOMO METAL IND [JP]) 12 July 2000 (2000-07-12) * claims 1-12 * * example 3; table 5 * * paragraph [0034] - paragraph [0060] * -----	1-3	
A		4,5	
X	EP 0 341 680 A1 (TOKUSEN KOGYO COMPANY LIMITED [JP]) 15 November 1989 (1989-11-15) * claims 1-7 * * tables I-III * * page 2, line 45 - page 7, line 20 * -----	1-3	
A		4,5	
X	US 4 020 887 A (VLASOV NIKOLAI NIKIFOROVICH ET AL) 3 May 1977 (1977-05-03) * claims 1-2 * * examples 1,2 * -----	1-3	
A		4,5	TECHNICAL FIELDS SEARCHED (IPC) C22C C21D
X	JP 60 152659 A (NIPPON STEEL CORP) 10 August 1985 (1985-08-10) * the whole document * -----	1-3	
A		4,5	
X	JP 2001 064753 A (NIPPON STEEL CORP) 13 March 2001 (2001-03-13) * the whole document * -----	1-3	
A		4,5	
X	JP 2000 336458 A (NIPPON STEEL CORP) 5 December 2000 (2000-12-05) * the whole document * -----	1-3	
A		4,5	
	-/--		
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 August 2010	Examiner Vlassi, Eleni
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 L : document cited for other reasons & : member of the same patent family, corresponding document			

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EUROPEAN SEARCH REPORT

Application Number
EP 08 01 4230

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2006/048864 A1 (NAGAO MAMORU [JP] ET AL) 9 March 2006 (2006-03-09) * claims 1-7 * * examples 1-3 * * paragraph [0027] - paragraph [0077] * -----	1-5	
A	JP 2000 219938 A (NIPPON STEEL CORP) 8 August 2000 (2000-08-08) * the whole document * -----	1-5	
A	EP 0 169 587 A1 (BEKAERT SA NV [BE]) 29 January 1986 (1986-01-29) * claims 1-9 * * examples 1-4 * -----	1-5	
A	EP 1 277 846 A1 (KOBE STEEL LTD [JP]) 22 January 2003 (2003-01-22) * claims 1-5 * * examples A-D * * paragraph [0007] - paragraph [0035] * -----	1-5	
A	EP 0 708 182 A1 (NIPPON STEEL CORP [JP]) 24 April 1996 (1996-04-24) * claims 1-9 * * examples 1-3 * -----	1-5	
A	US 2004/129354 A1 (NAGAO MAMORU [JP] ET AL) 8 July 2004 (2004-07-08) * claims 1-13 * * examples A-B * -----	1-5	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
Place of search The Hague		Date of completion of the search 30 August 2010	Examiner Vlassi, Eleni
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 L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 01 4230

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-08-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1674588 A1	28-06-2006	BR PI0506018 A	19-09-2006
		CN 1793399 A	28-06-2006
		KR 20060072074 A	27-06-2006
		TW 277656 B	01-04-2007
		US 2006130946 A1	22-06-2006
		US 2009223610 A1	10-09-2009
EP 1018565 A1	12-07-2000	AU 736258 B2	26-07-2001
		AU 4289499 A	10-01-2000
		CA 2300992 A1	29-12-1999
		CN 1272890 A	08-11-2000
		WO 9967437 A1	29-12-1999
		JP 3440937 B2	25-08-2003
		US 6277220 B1	21-08-2001
EP 0341680 A1	15-11-1989	JP 1292191 A	24-11-1989
		JP 1657297 C	13-04-1992
		JP 3023675 B	29-03-1991
US 4020887 A	03-05-1977	NONE	
JP 60152659 A	10-08-1985	NONE	
JP 2001064753 A	13-03-2001	NONE	
JP 2000336458 A	05-12-2000	NONE	
US 2006048864 A1	09-03-2006	CA 2500108 A1	08-04-2004
		CN 1685072 A	19-10-2005
		EP 1577410 A1	21-09-2005
		WO 2004029315 A1	08-04-2004
		JP 4088220 B2	21-05-2008
		JP 2004137597 A	13-05-2004
		KR 20050057267 A	16-06-2005
		TW 228542 B	01-03-2005
JP 2000219938 A	08-08-2000	NONE	
EP 0169587 A1	29-01-1986	BR 8503246 A	25-03-1986
		JP 61052348 A	15-03-1986
EP 1277846 A1	22-01-2003	BR 0202725 A	13-05-2003
		DE 60205825 D1	06-10-2005
		DE 60205825 T2	14-06-2006
		KR 20030003050 A	09-01-2003
		US 2003079815 A1	01-05-2003

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 01 4230

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-08-2010

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
EP 0708182	A1	24-04-1996	CA	2163894	A1	05-10-1995
			CN	1126501	A	10-07-1996
			DE	69429810	D1	21-03-2002
			DE	69429810	T2	19-09-2002
			WO	9526422	A1	05-10-1995
			US	5725689	A	10-03-1998

US 2004129354	A1	08-07-2004	AT	373114	T	15-09-2007
			AU	2003207212	A1	02-09-2003
			BR	0303066	A	09-03-2004
			CN	1498283	A	19-05-2004
			DE	60316256	T2	12-06-2008
			EP	1473375	A1	03-11-2004
			WO	03066923	A1	14-08-2003
			JP	4248790	B2	02-04-2009
			JP	2003226937	A	15-08-2003
