P/00/008
Section 29(1)
Regulation 3.1(2)

AUSTRALIA
Patents Act 1990

NOTICE OF ENTITLEMENT

We ISOVER SAINT-GOBAIN

of "LES MIROIRS"
18 AVENUE D'ALSACE
92400 COURBEVOIE
FRANCE

being the applicant and nominated person in respect of an application for a patent for an invention entitled MINERAL FIBRES CAPABLE OF DISSOLVING IN A PHYSIOLOGICAL MEDIUM (Application No. 42632/93), state the following:

1. The nominated person has, for the following reasons, gained entitlement from the actual inventor:

   The nominated person gains entitlement to the present invention from the actual inventors by way of contract of employment whereby the nominated person would be entitled to have assigned to it a patent granted to any of the actual inventors in respect of the said invention.

2. The nominated person has, for the following reasons, gained entitlement from the applicant listed in the declaration under Article 8 of the PCT:

   THE APPLICANT AND NOMINATED PERSON IS THE BASIC APPLICANT.

3. The basic application listed in the declaration under Article 8 of the PCT is/are the first application made in a Convention country in respect of the invention.

DATED: 29 February 1996

GRIFFITH HACK & CO.

ISOVER SAINT-GOBAIN

Patent Attorney for and
on behalf of the applicant

AU9342632

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(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 670439

(54) Title
MINERAL FIBRES CAPABLE OF DISSOLVING IN A PHYSIOLOGICAL MEDIUM

(51)[5] International Patent Classification(s)
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(56) Prior Art Documents
WO 9209536
WO 9002713
GB 2220654

(57) Claim

1. A mineral fibre capable of dissolving in a physiological medium, comprising by weight:

SiO_2	48 to 67%
Al_2O_3	0 to 3.9%
Fe_2O_3 (total iron)	0 to 12%
CaO	16 to 35%
MgO	1 to 16%
$Na_2O + K_2O$	1 to 6.5%
P_2O_5	0 to 5%

wherein the weight of:

$Na_2O + P_2O_5 \geq 2\%$

$Fe_2O_3 + Al_2O_3 \leq 12\%$ and

$CaO + MgO + Fe_2O_3 \geq 23\%$

OPI DATE 29/11/93 APPLN. ID 42632/93
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(71) Déposant *(pour tous les Etats désignés sauf US)*: ISOVER SAINT-GOBAIN [FR/FR]; 18, avenue d'Alsace, F-92400 Courbevoie (FR).

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(81) Etats désignés: AU, BR, CA, CZ, FI, HU, JP, KR, NO, NZ, PL, SK, US, brevet européen (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

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(54) Title: MINERAL FIBRES CAPABLE OF DISSOLVING IN A PHYSIOLOGICAL MEDIUM

(54) Titre: FIBRES MINERALES SUSCEPTIBLES DE SE DISSOUDRE EN MILIEU PHYSIOLOGIQUE

(57) Abstract

The present invention relates to compositions of mineral fibres capable of being dissolved in a physiological medium. The compositions of said fibres comprise the following constituants, in the weight proportions defined hereafter: SiO_2 48 - 67 %; Al_2O_3 0 - 8 %; Fe_2O_3 0 - 12 % (total iron expressed in this form); CaO 16 - 35 %; MgO 1 - 16 %; Na_2O + K_2O 0 - 6,5 %; P_2O_5 0 - 5 %; considering that these compositions are also defined by the fact that the contents of said constituants respect the following relationships: $Na_2O + P_2O_5 \geqslant 2$ %; $Fe_2O_3 + Al_2O_3 \leqslant 12$ %; $CaO + MgO + Fe_2O_3 \geqslant 23$ %.

(57) Abrégé

La présente invention concerne des compositions de fibres minérales susceptibles de se dissoudre au contact d'un milieu physiologique. Les compositions de ces fibres comprennent les constituants suivants, selon les proportions pondérales définies ci-après: SiO_2 48 à 67 %, Al_2O_3 0 à 8 %, Fe_2O_3 0 à 12 % (fer total exprimé sous cette forme), CaO 16 à 35 %, MgO 1 à 16 %, Na_2O + K_2O 0 à 6,5 %, P_2O_5 0 à 5 %, en considérant que ces compositions sont également définies par le fait que les teneurs de ces constituants respectent les relations suivantes: $Na_2O + P_2O_5 \geqslant 2$ %, $Fe_2O_3 + Al_2O_3 \leqslant 12$ %, $CaO + MgO + Fe_2O_3 \geqslant 23$ %.

MINERAL FIBRES WHICH CAN DISSOLVE IN A PHYSIOLOGICAL MEDIUM

The present invention relates to mineral fibres; more specifically it concerns mineral fibres of which the composition is such that they degrade as soon as they come into contact with a physiological medium.

Thermal and acoustic insulation of buildings is often produced from products which consist substantially of mineral wool, such as rock wool. The specific layout of the places to be insulated often leads people responsible for laying these products to cut them on the spot. This operation gives rise to breakages of the fibres, and can lead to dispersion of some of them in the atmosphere. A fibre can thus be inhaled accidentally.

Users have become aware of this risk, and it is desirable to provide them with replacement fibrous products, which, although they have the required insulation properties, can easily be dissolved by living tissue. This capacity for dissolving in a human organism is generally assessed by measuring the dissolving speed of the fibres in a solution which simulates an extracellular fluid.

The object of the present invention is mineral fibres which dissolve quickly in such a solution, but which maintain good mechanical resistance when they are subjected to heat.

This object is achieved by means of fibres, of which the composition comprises the following components, of which the content is expressed as a percentage by weight, in accordance with the limitations defined hereinafter;

SiO_2	48 to 67%
Al_2O_3	0 to 3.9%
Fe_2O_3 (total iron expressed in this form)	0 to 12%
CaO	16 to 35%
MgO	1 to 16%
$Na_2O + K_2O$	1 to 6.5%
P_2O_5	0 to 5%

taking into consideration that these compositions are also defined by the fact that the contents of these components comply with the following ratios:

$Na_2O + P_2O_5 \geq 2\%$

$Fe_2O_3 + Al_2O_3 \leq 12\%$

$CaO + MgO + Fe_2O_3 \geq 23\%$

According to the present invention, the presence of alkaline oxides, in particular Na_2O, and/or the

presence of phosphorous pentoxide in the composition of the mineral fibres previously defined, enables their dissolving speed in a solution which simulates an extracellular fluid to be increased.

Furthermore, an excessively high content of alkaline oxides, in particular Na_2O, detracts from satisfactory mechanical resistance of the mineral fibres according to the invention when they are subjected to heat.

For these reasons the mineral fibres contain at least 2 weight % Na_2O and or phosphorous pentoxide, the sum of the alkaline oxides not exceeding 6.5 weight %. According to the preferred limits, the sum of the alkaline oxides is between 1 and 6 %.

Silica is a component which decreases the speed at which the fibres dissolve. If its content by weight is high, this negative effect must be counterbalanced by increasing the components which promote dissolving of the fibres, such as for example Na_2O, by increasing the alumina content or by introducing phosphorous pentoxide into the composition. However, as previously stated, there is a limit to this increase. For this reason the SiO_2 content must not exceed 67%.

Iron oxides, expressed only in the form Fe_2O_3, as well as alumina, play a part in the dissolving speed. An excess of one and/or the other decreases the speed at which the fibres dissolve. A high dissolving speed can be maintained when the sum of the contents of these two oxides remains less than 12%, provided that the alumina content does not exceed 8%.

Although Al_2O_3 and iron oxides are not essential in the fibres according to the invention, their presence in the composition improves the mechanical resistance thereof, together with the addition of alkaline earth oxides.

The mineral fibres according to the invention thus have good mechanical resistance when they are subjected to heat, owing in particular to the fact that the composition includes lime, magnesium and iron oxides in proportions such that the sum of the contents of these oxides exceeds 23%, and preferably 25%.

The fibres according to the invention advantageously comprise the components listed hereinafter, in accordance with the following proportions by weight:

SiO_2	50 to 66%
Al_2O_3	0 to 3.9%
Fe_2O_3	0 to 11%
CaO	16 to 35%
MgO	3 to 16%
$Na_2O + K_2O$	1 to 6%
P_2O_5	0 to 5%

with $CaO + MgO + Fe_2O_3 > 25\%$

In general the most advantageous fibres according to the invention, which comply with any of the preceding definitions, comprise less than 3.5% Al_2O_3.

When the Fe_2O_3 content of the fibres according to the invention is equal to or more than 7%, their Al_2O_3 content is preferably equal to or less than 1%.

When the Fe_2O_3 content of the fibres according to the invention is equal to or more than 7%, their P_2O_5 content is preferably more than 1%.

The advantages of the fibres according to the invention will be better appreciated by means of the following detailed description, illustrated by some examples.

The attached tables include various compositions of mineral fibres which correspond to the definition of the invention, as well as a composition provided by way of comparative components.

The fibres which correspond to the compositions shown in table 1 are obtained from a fluid drawing device of the type described in patents US-A-3.532.479 and US-A-4.961.695.

The range of the diameters of the fibres tested, corresponding to examples no. 1 to 8, is such that 50% of them have a diameter smaller respectively than 2.2 µm - 2.5 µm - 3.1 µm - 3.7 µm - 3.5 µm - 3.4 µm - 3.7 µm.

The capacity of these fibres to be dissolved in a physiological environment is measured in the following experimental conditions: two hundred mg of fibres are placed between two perforated discs, separated by an annular ring. These two discs, of which the diameter is 4.3 cm, are covered by a polycarbonate filter. This assembly constitutes a measuring cell through which there circulates a solution which simulates an extracellular fluid, of which the flow rate is regulated by a peristaltic pump. This flow rate is 40 ml per day,

the duration of the test being 42 hours. The cell and the flask which contain the attack solution are maintained at 37°C. After passing through the cell, the attack solution is collected in bottles, for subsequent analysis.

The quantity of silica which has passed through the solution is measured by analysis; the weight of silica dissolved relative to the silica originally present in the fibre provides a percentile result which is a good indicator of the capacity of the fibre tested to dissolved in a physiological medium.

The attack solution selected has a composition in which the content of each component is expressed in g/l:

$MgCl_2.6H_2O$	0.212
NaCl	6.415
Na_2HPO_4	0.148
$Na_2SO_4.2H_2O$	0.179
$CaCl_2.4H_2O$	0.318
$NaHCO_3$	2.703
(Na_2 tartrate).$2H_2O$	0.180
(Na_3 citrate).$5.5H_2O$	0.186
Na lactate	0.175
Na pyruvate	0.172
Glycine	0.118

Additionally, the mechanical resistance of the fibres tested after being subjected to heat, is measured in the following conditions: a cubic sample of fibres, which has a density of approximately 100 kg/m^3, is placed in a tubular oven, of which the programmed temperature increase is 5°C per minute. The collapse of the sample is measured by optical observation. The temperature at which the sample collapses by 10% was selected as the evaluation criterion for the mechanical resistance of the fibres tested. The various results for dissolving of the fibres tested and their mechanical resistance, are listed in tables 2 and 3 respectively.

The composition which acts as a comparison criterion corresponds to example no. 1. A conventional basalt composition is involved, in which the iron oxide and alumina contents are high.

The composition which corresponds to example no. 2 shows the fibres according to the invention, in which the high silica content is compensated by the addition of Na_2O. Although the dissolving speed of the corresponding fibres is high, their mechanical resistance is lower than that of the basalt.

The fibres of which the composition corresponds to example no. 3 have slightly better mechanical resistance than the above, but their dissolving speed is slightly slower, probably owing to the iron oxide content. This decrease in the dissolving speed is substantially compensated by the introduction of P_2O_5, as shown in example no. 4. This dissolving speed can be increased considerably by maintaining or by improving the temperature resistance, as shown in example no. 5.

Amongst the fibres which comply with the above-described general definition of the invention, those which have a good compromise between the highest dissolving speeds and levels of mechanical resistance, are those of which the SiO_2 content is between 52 and 62%, the magnesium content being at least 3% and the alkaline oxide content being between 1 and 5%.

The fibres according to the invention, of which the CaO, MgO and Fe_2O_3 content is such that the sum of these constituents is equal to or greater than 32%, have a temperature corresponding to a 10% collapse which is at least equal to that of the basalt.

The compositions of these fibres are shown in examples no. 5 and 6.

Table 4 shows other compositions which correspond to the invention. The capacity of these glasses to be dissolved in a physiological medium is measured by means of a test performed on glass crushed mechanically, in the following conditions:

* the grains of glass obtained by crushing are screened and the granulometric fraction between 355 and 400 µm is retained for the test. The grains thus selected are washed in alcohol and dried in an oven. 1 g of this glass powder is placed in a cell identical to that previously described;
* the contents of NaCl and $CaCl_2$, which are respectively 6.6 and 0,022 g/l, differ slightly from those of the previous solution. The solution additionally comprises 1.08 g/l formaldehyde;
* the flow rate of this solution is 300 ml per day, and the duration of the test is two weeks, with intermediate measurements of one day and one week.

In table 4, example 1 which acts as a reference, is identical to that in table 1. At the end of one day, the attack on the glasses 9 to 11 is much greater than that on the reference glass, but the

effect of the composition is not shown at such an early age in the attack.

The same no longer applies at the end of a week. The increase in the Fe_2O_3 content is probably the cause of the decrease in the quantity of silica, but surprisingly this decrease is relatively slight. With a 10% content of Fe_2O_3, the glass in example 11 is still approximately ten times more soluble than the reference glass.

Glasses 12 and 13 show that the introduction of P_2O_5 and the almost complete elimination of Al_2O_3 enable high dissolving speeds to be obtained, despite the high content of Fe_2O_3 and absence of alkaline oxides.

Glasses no. 15 to 17 are intermediate variants as far as the Fe_2O_3 and Al_2O_3 contents are concerned, but with alkaline oxides.

Glass no. 14 shows compositions without iron oxide, and which have a high dissolving speed despite their large content of Al_2O_3.

Amongst the fibres according to the invention which comply with the general definition of the invention, a category of preferred compositions

corresponds to those defined by a phosphorous pentoxide content of between 1 and 4%.

The glasses according to the invention can be transformed into fibres by known external centrifuging devices, such as those described for example in patents US-A-2.663.051, EP-A-0.167.508 or FR-A-2.609.708.

The fibres thus obtained enable fibrous products of excellent quality to be obtained which are suitable for numerous applications. Thus for example fibres according to the invention are advantageously used in the form of geometrically well-defined panels, stiffened by a polymerised binder, or in the form of tubular products to be used for insulation of pipes. The fibres according to the invention can also be used as padding in the form of mats attached to cardboard or wire netting, or even loose as a filler.

TABLE 1

(compositions in percentage by weight)

Components	ex n°1	ex n°2	ex n°3	ex n°4	ex n°5	ex n°6	ex n°7	ex n°8
SiO_2	46,5	64,5	61,4	58,1	60,7	61,3	51,2	55,5
Fe_2O_3	12,5	0,43	6,1	7	1	1	4,5	3
AI2O3	13,4	0,77	0,2	0,2	0,3	0,3	3,5	3
CaO	10,6	19,4	18,6	18,4	28,1	20,85	26	29,6
MgO	9,4	8,5	8,8	9	6,4	14,6	11	6,5
Na2O	3,1	6	4,5	4,5	1,2	0,05	0,3	1,1
K2O	1,4	0,1	0,2	0,1	0,55	0,06	0,4	0,6
P205	0,43	0,15	0,1	2,6	2,6	2,6	2,8	0,1
TiO2	2,65	0,1	0,05	0,1	0,12	0,13	0,2	0,5

TABLE 2

(Quantity of SiO_2 dissolved as percentage)

Attack Time	ex n°1	ex n°2	ex n°3	ex n°4	ex n°5	ex n°6	ex n°7	ex n°8
42 days	3,5	27	21,9	33,8	43,2	36,5	24,3	14,2

TABLE 3

(Temperature corresponding to a collapse of 10%)

	ex n°1	ex n°2	ex n°3	ex n°4	ex n°5	ex n°6	ex n°7	ex n°8
Température in ° C	720	680	690	690	730	750	-	-

TABLE 4

(compositions in percentage by weight)

Components	ex n°1	ex n°9	ex n°10	ex n°11	ex n°12	ex n°13	ex n°14	ex n°15	ex n°16	ex n°17	ex n°18
SiO_2	46,5	61,4	59,4	57.3	53,8	50,2	61,0	61,3	59,9	60,2	60,6
Fe_2O_3	12,5	6,1	8,0	10,0	8,0	11,8	0,1	5,0	8,1	1,9	1
AI2O3	13,4	0,2	0,2	0,2	0,1	0,1	6,5	3,9	3,9	6,4	6,4
CaO	10,6	18,6	18,6	18,3	24,9	25,0	21	18,0	16,8	20,2	20,4
MgO	9,4	8,8	9,1	9,3	10,0	9,8	4,0	3,8	3,2	3,9	4
Na2O	3,1	4,5	4,3	4,5	0,02	0,02	4,9	4,8	4,9	2,4	2,8
K2O	1,4	0,2	0,15	0,2	0,05	0,05	0,1	0,1	0,1	1,6	1,9
P_2O_5	0,43	0,1	0,1	0,1	3,0	3,0	2,4	3,0	3,0	2,9	2,8
TiO2	2,65	0,05	0,1	0,12	0,14	0,14	0,1	0,1	0,1	0,4	0,1

TABLE 5

(Quantity of SiO_2 dissolved as percentage)

Attack Time	ex n°1	ex n°9	ex n°10	ex n°11	ex n°12	ex n°13	ex n°14	ex n°15	ex n°16	ex n°17	ex n°18
1 Day	0,015	0,068	0,098	0,075	0,246	0,121	0,218	0,083	-	-	-
1 Week	0,065	0,84	0,72	0,62	1,63	0,96	2,55	1,04	0,77	0,99	1,52
2 Weeks	<0,1						5,43	2,01	-	-	-

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A mineral fibre capable of dissolving in a physiological medium, comprising by weight:

SiO_2	48 to 67%
Al_2O_3	0 to 3.9%
Fe_2O_3 (total iron)	0 to 12%
CaO	16 to 35%
MgO	1 to 16%
$Na_2O + K_2O$	1 to 6.5%
P_2O_5	0 to 5%

wherein the weight of:

$Na_2O + P_2O_5 \geq 2\%$

$Fe_2O_3 + Al_2O_3 \leq 12\%$ and

$CaO + MgO + Fe_2O_3 \geq 23\%$

2. A mineral fibre according to claim 1, comprising by weight:

SiO_2	50 to 66%
Al_2O_3	0 to 3.9%
Fe_2O_3 (total iron)	0 to 11%
CaO	16 to 35%
MgO	3 to 16%
$Na_2O + K_2O$	1 to 6%
P_2O_5	0 to 5%

wherein the weight of $CaO + MgO + Fe_2O_3 > 25\%$

3. A mineral fibre according to any one of the preceding claims, wherein the Al_2O_3 content is less than 3.5%.

4. A mineral fibre according to any one of the preceding claims, wherein the Al_2O_3 content is equal to or lower than 1% when the Fe_2O_3 content is equal to or more

than 7%.

5. A mineral fibre according to any one of the preceding claims, comprising lime, magnesium and iron oxides wherein lime + magnesium + iron oxides > 32%.

6. A mineral fibre according to any one of the preceding claims, wherein the phosphorous pentoxide content is between 1 and 4%.

7. A product for thermal and/or acoustic insulation, comprising mineral fibres, wherein said fibres have a chemical composition such as defined by any one of the preceding claims.

8. A mineral fibre as hereinbefore described with reference to any one of the foregoing examples apart from the comparative examples.

DATED: 22 May 1996
ISOVER SAINT-GOBAIN
By its Patent Attorneys:
GRIFFITH HACK & CO
Fellows Institute of Patent
Attorneys of Australia

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FR 93/00393

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.^{5} C03C13/06; C03C3/097

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl.^{5} C03C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO, A, 9 209 536 (PAROC OY AB) 11 June 1992	1-3,5-7
P,A	see page 4, line 15 - line 36; claims	4

X	WO, A, 9 002 713 (ROCKWOOL INTERNATIONAL) 22 March 1990	1-2,5
A	see claims	3-4,6-7

X	GB, A, 2 220 654 (GLASS INC) 17 January 1990	1-2,5
A	see claim 1	3-4,6-7

X	FR, A, 2 662 687 (ISOVER SAINT-GOBAIN) 6 December 1991	1
A	see claims	2-7

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 August 1993 (13.08.93)	7 September 1993 (07.09.93)
Name and mailing address of the ISA/ European Patent Office	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FR 93/00393

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CHEMICAL ABSTRACTS; Vol. 92, No. 24, 16 June 1980, Columbus, Ohio, US; abstract No. 202476v, page 259; column L; see abstract & FI,A, 56 820 (PARAISTEN KALKKI OY-PARGAS KALK AB) 31 December 1979 ---	1-7
A	EP, A,0 459 897 (ISOVER SAINT-GOBAIN) 4 December 1991 see claims ----------	1-7

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

FR 9300393
SA 73174

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international 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. 13/08/93

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO-A-9209536	11-06-92	AU-A-	8908791	25-06-92
WO-A-9002713	22-03-90	EP-A-	0454674	06-11-91
GB-A-2220654	17-01-90	None		
FR-A-2662687	06-12-91	None		
EP-A-0459897	04-12-91	FR-A-	2662688	06-12-91
		AU-A-	7731891	05-12-91
		CA-A-	2043699	02-12-91
		CN-A-	1059135	04-03-92
		JP-A-	4228455	18-08-92

RAPPORT DE RECHERCHE INTERNATIONALE

Demande internationale No PCT/FR 93/00393

I. CLASSEMENT DE L'INVENTION (si plusieurs symboles de classification sont applicables, les indiquer tous) ?

Selon la classification internationale des brevets (CIB) ou à la fois selon la classification nationale et la CIB

CIB 5 C03C13/06; C03C3/097

II. DOMAINES SUR LESQUELS LA RECHERCHE A PORTE

Documentation minimale consultée[8]

Système de classification	Symboles de classification
CIB 5	C03C

Documentation consultée autre que la documentation minimale dans la mesure où de tels documents font partie des domaines sur lesquels la recherche a porté[9]

III. DOCUMENTS CONSIDERES COMME PERTINENTS[10]

Catégorie °	Identification des documents cités, avec indication, si nécessaire,[12] des passages pertinents[13]	No. des revendications visées[14]
P,X	WO,A,9 209 536 (PAROC OY AB) 11 Juin 1992	1-3,5-7
P,A	voir page 4, ligne 15 - ligne 36; revendications	4

X	WO,A,9 002 713 (ROCKWOOL INTERNATIONAL) 22 Mars 1990	1-2,5
A	voir revendications	3-4,6-7

X	GB,A,2 220 654 (GLASS INC) 17 Janvier 1990	1-2,5
A	voir revendication 1	3-4,6-7

X	FR,A,2 662 687 (ISOVER SAINT-GOBAIN) 6 Décembre 1991	1
A	voir revendications	2-7

	-/--	

° Catégories spéciales de documents cités:[11]

"A" document définissant l'état général de la technique, non considéré comme particulièrement pertinent

"E" document antérieur, mais publié à la date de dépôt international ou après cette date

"L" document pouvant jeter un doute sur une revendication de priorité ou cité pour déterminer la date de publication d'une autre citation ou pour une raison spéciale (telle qu'indiquée)

"O" document se référant à une divulgation orale, à un usage, à une exposition ou tous autres moyens

"P" document publié avant la date de dépôt international, mais postérieurement à la date de priorité revendiquée

"T" document ultérieur publié postérieurement à la date de dépôt international ou à la date de priorité et n'appartenant pas à l'état de la technique pertinent, mais cité pour comprendre le principe ou la théorie constituant la base de l'invention

"X" document particulièrement pertinent; l'invention revendiquée ne peut être considérée comme nouvelle ou comme impliquant une activité inventive

"Y" document particulièrement pertinent; l'invention revendiquée ne peut être considérée comme impliquant une activité inventive lorsque le document est associé à un ou plusieurs autres documents de même nature, cette combinaison étant évidente pour une personne du métier.

"&" document qui fait partie de la même famille de brevets

IV. CERTIFICATION

Date à laquelle la recherche internationale a été effectivement achevée	Date d'expédition du présent rapport de recherche internationale
13 AOUT 1993	07.09.93
Administration chargée de la recherche internationale	**Signature du fonctionnaire autorisé**
OFFICE EUROPEEN DES BREVETS	KUEHNE H.C.

III. DOCUMENTS CONSIDERES COMME PERTINENTS [14] (SUITE DES RENSEIGNEMENTS INDIQUES SUR LA DEUXIEME FEUILLE)

Catégorie *	Identification des documents cités, [16] avec indication, si nécessaire des passages pertinents [17]	No. des revendications visées [18]
A	CHEMICAL ABSTRACTS, vol. 92, no. 24, 16 Juin 1980, Columbus, Ohio, US; abstract no. 202476v, page 259 ;colonne L ; voir abrégé & FI,A,56 820 (PARAISTEN KALKKI OY-PARGAS KALK AB) 31 Décembre 1979 ---	1-7
A	EP,A,0 459 897 (ISOVER SAINT-GOBAIN) 4 Décembre 1991 voir revendications -----	1-7

ANNEXE AU RAPPORT DE RECHERCHE INTERNATIONALE
RELATIF A LA DEMANDE INTERNATIONALE NO. FR 9300393
SA 73174

La presente annexe indique les membres de la famille de brevets relatifs aux documents brevets cités dans le rapport de recherche internationale visé ci-dessus.
Lesdits membres sont contenus au fichier informatique de l'Office européen des brevets à la date du 13/08/93
Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l'Office européen des brevets.

Document brevet cité au rapport de recherche	Date de publication	Membre(s) de la famille de brevet(s)		Date de publication
WO-A-9209536	11-06-92	AU-A-	8908791	25-06-92
WO-A-9002713	22-03-90	EP-A-	0454674	06-11-91
GB-A-2220654	17-01-90	Aucun		
FR-A-2662687	06-12-91	Aucun		
EP-A-0459897	04-12-91	FR-A-	2662688	06-12-91
		AU-A-	7731891	05-12-91
		CA-A-	2043699	02-12-91
		CN-A-	1059135	04-03-92
		JP-A-	4228455	18-08-92

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