CPC  COOPERATIVE PATENT CLASSIFICATION

CHEMISTRY; METALLURGY  
(NOTES omitted)

CHEMISTRY

C04  CEMENTS; CONCRETE; ARTIFICIAL STONE; CERAMICS; REFRACTORIES  
(NOTE omitted)

C04B  LIME, MAGNESIA; SLAG; CEMENTS; COMPOSITIONS THEREOF, e.g. MORTARS, CONCRETE OR LIKE BUILDING MATERIALS; ARTIFICIAL STONE  
((roofing granules E04D 7/005)); CERAMICS (devitrified glass-ceramics C03C 10/00); REFRACTORIES; TREATMENT OF NATURAL STONE

NOTES

1. In this subclass, the following terms or expressions are used with the meanings indicated:  
   • "fillers" includes pigments, aggregates and fibrous reinforcing materials;  
   • "active ingredients" includes processing aids or property improvers, e.g. grinding aids used after the burning process or used in the absence of a burning process;  
   • "mortars", "concrete" and "artificial stone" are to be considered as a single group of materials, and therefore, in the absence of an indication to the contrary, they include mortar, concrete and other cementitious compositions.

2. In groups C04B 7/00 - C04B 32/00, in the absence of an indication to the contrary, classification is made in the last appropriate place.

3. A composition classified in groups C04B 26/00 or C04B 28/00 is also classified in groups C04B 14/00 - C04B 24/00 if a filler or active ingredient is of interest.

4. In groups C04B 2/00 - C04B 32/00 and C04B 38/00 - C04B 41/00 it is desirable to classify the individual constituents of the mixtures, or other aspects relating to the mixtures or constituents, using Combination Sets with symbols chosen from groups C04B 2/00 - C04B 41/00.

5. In groups C04B 2/00 - C04B 32/00 and C04B 38/00 - C04B 41/00 it is desirable to classify the function of the individual constituents of the mixtures, or other aspects relating to the properties or uses of the mixtures or products obtained, using Combination Sets with symbols chosen from groups C04B 20/123 and C04B 20/126.

6. Groups C04B 20/123 and C04B 20/126 are used for indexing purposes only of documents classified in C04B 20/12.

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

   C04B 5/02 covered by B01J 2/00, C21B 3/06
   C04B 28/20, C04B 28/22 covered by C04B 28/18, C04B 28/182, C04B 28/184, C04B 28/186, C04B 28/188
   C04B 35/28 covered by C04B 35/26
   C04B 35/30 covered by C04B 35/26
   C04B 35/32 covered by C04B 35/26
   C04B 35/34 covered by C04B 35/26
   C04B 35/36 covered by C04B 35/26
   C04B 35/38 covered by C04B 35/26
   C04B 35/40 covered by C04B 35/2608, C04B 35/2641, C04B 35/2675
   C04B 35/582 covered by C04B 35/581, C04B 35/806
   C04B 35/5833, C04B 35/5835 covered by C04B 35/583, C04B 35/806
   C04B 35/599 covered by C04B 35/597
   C04B 35/81 covered by C04B 35/78
   C04B 35/84 covered by C04B 35/628, C04B 35/78
CPC - 2019.08

Lime; Magnesia; Slag

C04B (continued)

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

Lime; Magnesia; Slag

2/00 Lime, magnesia or dolomite (hydraulic lime cements C04B 7/34)

2/005 [obtained from an industrial by-product]

2/02 Lime [(obtaining Ca(OH)₂ otherwise than by simple slaking of quick lime C01F 11/02)]

2/04 Slaking [(simultaneous dehydrating of gypsum and slaking of lime C04B 11/022)]

2/045 [After-treatment of slaked lime]

2/06 with addition of substances, e.g. hydrophobic agents; (Slaking in the presence of other compounds)

2/063 [Slaking of impure quick lime, e.g. contained in fly ash]

2/066 [Making use of the hydration reaction, e.g. the reaction heat for dehydrating gypsum; Chemical drying by using unslaked lime]

2/08 Devices therefor

2/10 Preheating, burning calcining or cooling (decarbocation during burning of cement raw materials C04B 7/42; (obtaining CaO or MgO otherwise than by thermal decomposition of the corresponding carbonates C01F 11/02, C01F 5/02))

2/102 (of magnesia, e.g. dead burning]

2/104 [Ingredients added before or during the burning process]

2/106 [in fluidised bed furnaces]

2/108 [Treatment or selection of the fuel therefor]

2/12 in shaft or vertical furnaces (shaft or vertical furnaces in general F27B 1/00)

5/00 Treatment of (metallurgical) slag (manufacture of slag wool C03B; in or for, the production of metals C21B, C22B); Artificial stone from molten (metallurgical) slag (mechanical aspects B28B 1/54 [other cast stone C04B 32/005])

5/06 Ingredients, other than water, added to the molten slag [or to the granulating medium or before remelting]; Treatment with gases or gas generating compounds, e.g. to obtain porous slag

5/065 [Porous slag]

Cements

7/00 Hydraulic cements (calcium sulfate cements C04B 11/00)

7/003 [Barium or strontium cements]

7/006 [Cement-clinker used in the unground state in mortar - or concrete compositions]

7/02 Portland cement

7/04 using raw materials containing gypsum; (i.e. processes of the Mueller-Kuehne type)

7/06 using alkali raw materials (C04B 7/60 takes precedence)

7/12 Natural pozzuolanas; Natural pozzuolana cements; (Artificial pozzuolanas or artificial pozzuolana cements other than those obtained from waste or combustion residues, e.g. burned clay; Treating inorganic materials to improve their pozzuolanic characteristics) (cements containing slag C04B 7/14)

7/13 Mixtures thereof with inorganic cementitious materials, e.g. Portland cements

7/14 Cements containing slag (slags from waste incineration C04B 7/28)

7/147 Metallurgical slag

7/153 Mixtures thereof with other inorganic cementitious materials or other activators

7/1555 [with alkali metal containing activators, e.g. sodium hydroxide or waterglass]

7/17 with calcium oxide containing activators [(C04B 7/1535 takes precedence)]

7/19 Portland cements

7/21 with calcium sulfate containing activators [(C04B 7/1535 takes precedence)]

7/22 Iron ore cements; (Iron rich cements, e.g. Ferrari cements, Kühl cements)

7/24 Cements from oil shales, residues or waste other than slag

7/243 Mixtures thereof with activators or composition-correction additives, e.g. mixtures of fly ash and alkali activators)

7/246 from waste building materials, e.g. waste asbestos-cement products, demolition waste

7/26 from raw materials containing flue dust; (i.e. fly ash C04B 7/243 takes precedence)

7/28 from combustion residues, e.g. ashes or slags from waste incineration] [(C04B 7/243), C04B 7/26 (take precedence)]

7/30 from oil shale; from oil shale residues; (from lignite processing, e.g. using certain lignite fractions)

7/32 Aluminous cements

7/323 [Calcium aluminosulfate cements, e.g. cements hydrating into ettringite]

7/326 [Calcium aluminoaluminate cements, e.g. based on 11CaO.7Al₂O₃.CaX₂, where X is Cl or F]

7/34 Hydraulic lime cements; Roman cements; [natural cements]

7/345 Hydraulic cements not provided for in one of the groups C04B 7/02 - C04B 7/34

7/3453 [Belite cements, e.g. self-disintegrating cements based on dicalciumsilicate]

7/3456 [Alinite cements, e.g. "Nudelman"-type cements, bromo-alinite cements, fluoro-alinite cements]

7/36 Manufacture of hydraulic cements in general

7/361 Condition or time responsive control in hydraulic cement manufacturing processes (controlling or regulating in general G05; F27B 7/42 takes precedence)

7/362 [for raw materials handling, e.g. during the grinding or mixing step]

7/364 [Avoiding environmental pollution during cement-manufacturing]
Cements

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/47</td>
<td>Active ingredients added before, or during, the calcining step, the evacuated material being used as a material before the final burning or melting step, the evacuated material being used as a cement as such</td>
</tr>
<tr>
<td>7/48</td>
<td>Clinker treatment ( (C04B 7/47 \text{ takes precedence}) )</td>
</tr>
</tbody>
</table>

**Cements**

- Calcium sulfate cements
- Magnesium cements or similar cements
- Calcium sulphate cements
- Hydrating
- Grinding \( [: \text{After-treatment of ground cement}] \)
- [After-treatment of ground cement \( (C04B 7/368 \text{ takes precedence}) \)]
- [Briquetting \( (C04B 7/48 \text{ takes precedence}) \)]
- [Magnesium cements containing chlorides, e.g. Sorel cement \( (C04B 7/368 \text{ takes precedence}) \)]
- [Magnesium cements containing sulfates, nitrates, phosphates or fluorides \( (C04B 7/368 \text{ takes precedence}) \)]
- [Cements containing metal compounds other than phosphates or fluorides \( (C04B 7/368 \text{ takes precedence}) \)]
- Magnesium cements containing sulfates, nitrates, phosphates or fluorides
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11/06 . starting from anhydrite
11/26 . [straining from chemical gypsum]; starting from phosphogypsum or from waste, e.g. purification products of smoke (C04B 11/02 takes precedence; chemical purification of smoke, fumes or exhaust gases B01D 53/00 [purification of gypsum C01F 11/46])
11/262 . [waste gypsum other than phosphogypsum]
11/264 . [Gypsum from the desulphurisation of flue gases]
11/266 . [Chemical gypsum]
11/268 . [pelletizing of the material before starting the manufacture]
11/28 . Mixtures thereof with other inorganic cementitious materials (C04B 7/04, C04B 7/153 take precedence)
11/30 . . with hydraulic cements, e.g. Portland cements

12/00 Cements not provided for in groups C04B 7/00 - C04B 11/00
12/005 . [Geopolymer cements, e.g. reaction products of aluminosilicates with alkali metal hydroxides or silicates]
12/02 . Phosphate cements (in, or for, the manufacture of ceramics C04B 33/00, C04B 35/00)
12/022 . [Al-phosphates]
12/025 . [Phosphates of ammonium or of the alkali or alkaline earth metals]
12/027 . [mixtures thereof with other inorganic cementitious materials]
12/04 . Alkali metal or ammonium silicate cements [Alkyl silicate cements; Silica sol cements; Soluble silicate cements] (alkali metal silicates per se, their preparation C01B 33/32; ammonium silicates per se, their preparation C01C 1/00)

Use of materials as fillers (ceramics C04B 33/00, C04B 35/00; reinforcing elements for building materials E04C 5/00)

14/00 Use of inorganic materials as fillers, e.g. pigments, for mortars, or concrete or artificial stone; Treatment of inorganic materials specially adapted to enhance their filling properties in mortars, concrete or artificial stone (expanding or defibrillating materials C04B 20/000)

NOTE
Fillers with a well-defined shape other than granular are considered to be reinforcing elements and thus are classified in E04C 5/00. However, if they are only characterised by their composition, classification is made in C04B only

14/005 . [Inorganic fillers with a shape other than granular or fibrous (carbon nanotubes C04B 14/026)]
14/02 . Granular materials [e.g. microballoons]
14/022 . [Carbon]
14/024 . [Graphite]
14/026 . [of particular shape, e.g. nanotubes]
14/028 . [Carbon aerogels]
14/04 . Silica-rich materials; Silicates
14/041 . [Aluminium silicates other than clay]
14/042 . [Magnesium silicates, e.g. talc, sepiolite]
14/043 . [Alkaline-earth metal silicates, e.g. wollastonite]
14/044 . [Polysilicates, e.g. geopolymers]
14/045 . [Alkali-metal containing silicates, e.g. petalite (waterglass C04B 12/04)]
14/046 . [Zircon]
14/047 . [Zeolites]
14/048 . [Granite]
14/06 . Quartz, Sand
14/062 . [Microsilica, e.g. colloidal silica (preparing microsilica slurries or suspensions C04B 18/148)]
14/064 . [Silica aerogel]
14/066 . [Precipitated or pyrogenic silica]
14/068 . [Specific natural sands, e.g. sea -, beach -, dune - or desert sand]
14/08 . Diatomaceous earth
14/10 . Clay [(sepiolite C04B 14/042; grog C04B 18/025)]
14/102 . [Atapulgite clay]
14/104 . [Bentonite, e.g. montmorillonite]
14/106 . [Kaolin]
14/108 . [Shale, slate (colliery shale C04B 18/125)]
14/12 . Expanded clay
14/14 . Minerals of volcanic origin [(granite C04B 14/048)]
14/16 . Porous, e.g. pumice
14/18 . Perlite
14/185 . [Expanded]
14/20 . Mica; Vermiculite [(mechanical splitting B28D)]
14/202 . [Vermiculite]
14/204 . [Expanded]
14/206 . [Mica or vermiculite modified by cation-exchange; chemically exfoliated vermiculite]
14/208 . [Delaminated mica or vermiculite platelets]
14/22 . Glass [(Devitrified glass]
14/24 . Porous, e.g. foamed glass
14/26 . Carbonates
14/28 . Porous, e.g. foamed glass
14/285 . [Marble]
14/30 . Oxides other than silica [(ferrites C04B 14/363)]
14/301 . [Porous or hollow]
14/302 . [Aerogels]
14/303 . [Alumina]
14/304 . [Magnesia]
14/305 . [Titanium oxide, e.g. titanates]
14/306 . [Zirconium oxide (zircon C04B 14/046)]
14/307 . [Chromium oxide]
14/308 . [Iron oxide]
14/309 . [Copper oxide or solid solutions thereof]
14/32 . Carbides; Nitrides; Borides [Silicides]
14/321 . [Borides]
14/322 . [Carbides]
14/323 . [Boron carbide]
14/324 . [Silicon carbide]
14/325 . [Nitrides]
14/326 . [Aluminium nitride]
14/327 . [Boron nitride]
14/328 . [Silicon nitride]
14/34 . Metals [e.g. ferro-silicon]
14/36 . Inorganic materials not provided for in groups (C04B 14/022 and) C04B 14/04 - C04B 14/34
Use of materials as fillers

16/00 Use of organic materials as fillers, e.g. pigments, for mortars, concrete or artificial stone; Treatment of organic materials specially adapted to enhance their filling properties in mortars, concrete or artificial stone

NOTE

Fillers with a well defined shape other than granular are considered to be reinforcing elements and thus are classified in E04C 5/00. However, if they are only characterised by their composition, classification is made in C04B only

16/02 Cellulosic materials (cellulosic waste materials, e.g. sawdust, rice husks, C04B 18/24)
16/04 Macromolecular compounds (C04B 16/02 takes precedence)
16/06 fibrous
16/0608 [Fibrilles, e.g. fibrillated films]
16/0616 [from polymers obtained by reactions only involving carbon-to-carbon unsaturated bonds]
16/0625 [Polyalkenes, e.g. polyethylene]
16/0633 [Polypropylene]
16/0641 [Polyvinylalcohols; Polyvinylacetates]
16/065 [Polyacrylates; Polymethacrylates]
16/0658 [Polyacrylonitrile]
16/0666 [Polystyrene]
16/0675 [from polymers obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds]
16/0683 [Polyesters, e.g. polylactides]
16/0691 [Polyamides; Polyaramides]
16/08 porous, e.g. expanded polystyrene beads (or microballoons)
16/082 [other than polystyrene based, e.g. polyurethane foam]
16/085 [expanded in situ, i.e. during or after mixing the mortar, concrete or artificial stone ingredients]
16/087 [shredded]
16/10 Treatment for enhancing the mixability with the mortar (coating C04B 20/10)
16/12 characterised by the shape (fibrous macromolecular compounds C04B 16/06; porous macromolecular compounds C04B 16/08) (. e.g. perforated strips)
Use of materials as fillers

18/06. . . . Combustion residues, e.g. purification products of smoke, fumes or exhaust gases
18/061. . . . [Ashes from fluidised bed furnaces]
18/062. . . . [Purification products of smoke, fume or exhaust-gases]
18/064. . . . [Gypsum]
18/065. . . . [Residues from coal gasification]
18/067. . . . [Slags]
18/068. . . . [from burning wood]
18/08. . . . Flue dust, i.e. fly ash
18/081. . . . [from brown coal or lignite]
18/082. . . . [Cenospheres]
18/084. . . . [obtained from mixtures of pulverised coal and additives, added to influence the composition of the resulting flue dust]
18/085. . . . [Pelletizing]
18/087. . . . [from liquid fuels, e.g. oil]
18/088. . . . [in high volume fly ash compositions]
18/10 . . . . [Burned or pyrolysed] refuse
18/101. . . . [Burned rice husks or other burned vegetable material]
18/103. . . . [Burned or pyrolysed sludges]
18/105. . . . [Gaseous combustion products or dusts collected from waste incineration, e.g. sludge resulting from the purification of gaseous combustion products of waste incineration]
18/106. . . . [Fly ash from waste incinerators]
18/108. . . . [involving a melting step]
18/12 . . . . [from quarries, mining or the like]
18/125. . . . [Slate residues, e.g. colliery shale or oil shale or oil shale ash]
18/14 . . . . [from metallurgical processes (treatment of slag C04B 5/00); for manufacture of cement C04B 7/14)
18/141. . . . [Slags]
18/142. . . . [Steelmaking slags, converter slags]
18/143. . . . . . . [L.D. slags, i.e. Linz-Donawitz slags]
18/144. . . . [Slags from the production of specific metals other than iron or of specific alloys, e.g. ferrochrome slags]
18/145. . . . [Phosphorus slags]
18/146. . . . [Silica fume]
18/147. . . . [Conditioning]
18/148. . . . . . . [Preparing silica fume slurries or suspensions]
18/149. . . . [other than silica fume or slag]
18/16 . . . . from building or ceramic industry ((separating plants for waste concrete slurry B03B 9/063)]
18/162. . . . [Cement kiln dust; Lime kiln dust]
18/165. . . . [Ceramic waste]
18/167. . . . [Recycled material, i.e. waste material reused in the production of the same material]
18/18 . . . . organic (C04B 18/10 takes precedence)
18/20 . . . . from macromolecular compounds ((recycled expanded polystyrene C04B 16/083]
18/22 . . . . Rubber, e.g. ground waste tires
18/24 . . . . Vegetable refuse, e.g. rice husks, maize-ear refuse; Cellulosic materials, e.g. paper, cork
18/241. . . . [Paper, e.g. waste paper; Paper pulp]
18/243. . . . [Waste from paper processing or recycling paper, e.g. de-inking sludge (burned paper processing waste C04B 18/10)]
18/245. . . . [Cork; Bark]

18/246. . . . [expanded]
18/248. . . . [from specific plants, e.g. hemp fibres]
18/26 . . . . Wood, e.g. sawdust, wood shavings
18/265. . . . [from specific species, e.g. birch]
18/28 . . . . Mineralising; Compositions therefor
18/30 . . . . Mixed waste: Waste of undefined composition, (C04B 18/10 takes precedence)
18/305. . . . [Municipal waste]

20/00 Use of materials as fillers for mortars, concrete or artificial stone according to more than one of the groups C04B 14/00 - C04B 18/00 and characterised by shape or grain distribution; Treatment of materials according to more than one of the groups C04B 14/00 - C04B 18/00 specially adapted to enhance their filling properties in mortars, concrete or artificial stone; Expanding or defibrillating materials

NOTE Fillers with a well-defined shape other than granular are considered to be reinforcing elements and thus are classified in E04C 5/00. However, if they are only characterised by their composition, classification is made in C04B only.

20/0004. . . . [Microcomposites or nanocomposites, e.g. composite particles obtained by polymerising monomers onto inorganic materials]
20/0008. . . . [Materials specified by a shape not covered by C04B 20/0016 - C04B 20/0056, e.g. nanotubes]
20/0012. . . . [Irregular shaped fillers]
20/0016. . . . [Granular materials, e.g. microballoons]
20/002. . . . [Hollow or porous granular materials]
20/0024. . . . [expanded in situ, i.e. the material is expanded or made hollow after primary shaping of the mortar, concrete or artificial stone mixture (C04B 16/085 takes precedence)]
20/0028. . . . [crushable]
20/0032. . . . [characterised by the gas filling pores, e.g. inert gas or air at reduced pressure]
20/0036. . . . [Microsized or nanosized]
20/0004. . . . [inorganic]
20/0044. . . . [obtained from irregularly shaped particles]
20/0048. . . . [Fibrous materials]
20/0052. . . . [Mixtures of fibres of different physical characteristics, e.g. different lengths]
20/0056. . . . [Hollow or porous fibres]
20/006. . . . [Microfibres; Nanofibres]
20/0064. . . . [Ground fibres]
20/0068. . . . [Composite fibres, e.g. fibres with a core and sheath of different material]
20/0072. . . . [Continuous fibres]
20/0076. . . . [characterised by the grain distribution]
20/0008. . . . [Micro- or nanosized fillers, e.g. micronised fillers with particle size smaller than that of the hydraulic binder (colloidal silica C04B 14/062; silica fume C04B 18/146)]
20/0084. . . . [Conditioning, e.g. preparing suspensions thereof (C04B 18/148 takes precedence)]
20/0088. . . . [Fillers with mono- or narrow grain size distribution]
20/0092 . . . . [Fillers with fine grain sizes only]
20/0096 . . . . [Fillers with bimodal grain size distribution]
20/02 . . . . Treatment
Use of materials as fillers

Use of inorganic materials as active ingredients for mortars, concrete or artificial stone, e.g. accelerators, shrinkage compensating agents

NOTE

Active ingredients which react with cement compounds for forming new or modified mineralogical phases and are added before the hardening process, as well as cements added as additives to other cements, are classified in groups C04B 7/00 - C04B 12/00, e.g. in group C04B 7/42.

C04B 22/00 Use of inorganic materials as active ingredients for mortars, concrete or artificial stone, e.g. accelerators, shrinkage compensating agents

22/006 Waste inorganic materials
22/0013 Boron compounds
22/002 Water
22/0026 Salt water, e.g. seawater
22/0033 Other than sea water, e.g. from mining activities
22/004 Containing dissolved additives or active agents, i.e. aqueous solutions used as gauging water (C04B 22/0026 takes precedence)
22/0046 Waste slurries or solutions used as gauging water
22/0053 Added in a particular physical form, e.g. atomised or in the gas phase
22/006 Released by a chemical reaction, e.g. polymer condensation
22/0066 Compounds chosen for their high crystalwater content
22/0073 Added in the non-hydrated or only partially-hydrated form
22/008 Cement and like inorganic materials added as expanding or shrinkage compensating ingredients in mortar or concrete compositions, the expansion being the result of a recrystallisation (mixtures of cements C04B 7/00, C04B 28/00)
22/0086 Seeding materials
22/0093 Aluminates
22/02 Elements
22/04 Metals, e.g. aluminium used as blowing agent
22/06 Oxides, Hydroxides (C04B 22/0013 takes precedence)
22/062 Of the alkali or alkaline-earth metals
22/064 Of the alkaline-earth metals
22/066 Magnesia; Magnesium hydroxide
22/068 Peroxides, e.g. hydrogen peroxide
22/08 Acids or salts thereof ((C04B 22/0013 takes precedence))
22/082 Acids
22/085 Containing nitrogen in the anion, e.g. nitrites
22/087 Containing chromium in the anion, e.g. chromates
22/10 Containing carbon in the anion
22/103 Acids
22/106 Bicarbonates
22/12 Containing halogen in the anion
22/122 Acids
22/124 Chlorides of ammonium or of the alkali or alkaline earth metals, e.g. calcium chloride
22/126 Fluorine compounds, e.g. silico-fluorine compounds
22/128 Bromine compounds
22/14 Containing sulfur in the anion, e.g. sulfides
22/141 Acids
Use of materials as active ingredients

22/142 . . . [Sulfates]
22/143 . . . . [Calcium-sulfate]
22/144 . . . . . [Phosphogypsum]
22/145 . . . . . [Gypsum from the desulfuration of flue gases]
22/146 . . . . . [other waste Ca-sulfate]
22/147 . . . . . [Alkali-metal sulfates; Ammonium sulfate]
22/148 . . . . . [Aluminium-sulfate]
22/149 . . . . . [Iron-sulfates]
22/16 . . . containing phosphorus in the anion, e.g. phosphates
22/165 . . . . . [Acids]

24/00 Use of organic materials as active ingredients for mortars, concrete or artificial stone, e.g. plasticisers

NOTE
Groups C04B 24/003 - C04B 24/006 take precedence over groups C04B 24/008 - C04B 24/226

24/001 . . . [Waste organic materials]
24/003 . . . [Phosphorus-containing compounds]
24/005 . . . [Halogen-containing compounds]
24/006 . . . [Boron-containing compounds]
24/008 . . . [Aldehydes, ketones]
24/02 . . . [Alcohols; Phenols; Ethers]
24/023 . . . . . [Ethers]
24/026 . . . . . [Fatty alcohols]
24/04 . . . . Carboxylic acids; Salts, anhydrides or esters thereof
24/045 . . . . . [Esters, e.g. lactones]
24/06 . . . . containing hydroxy groups
24/08 . . . . Fats; Fatty oils; Ester type waxes; Higher fatty acids, i.e. having at least seven carbon atoms in an unbroken chain bound to a carboxyl group; Oxidised oils or fats
24/085 . . . . [Higher fatty acids]
24/10 . . . Carbohydrates or derivatives thereof
24/12 . . . Nitrogen containing compounds [organic derivatives of hydrazine (hydrazine C04B 22/00)]
24/121 . . . . . [Amines, polyamines]
24/122 . . . . . [Hydroxy amines]
24/123 . . . . . [Amino-carboxylic acids]
24/124 . . . . . [Amides]
24/125 . . . . . [Compounds containing one or more carbon-to-nitrogen double or triple bonds, e.g. imines]
24/126 . . . . . [Urea]
24/127 . . . . . [Nitro-compounds]
24/128 . . . . . [Heterocyclic nitrogen compounds]
24/129 . . . . . [Compounds containing one or more nitrogen-to-nitrogen double bonds, e.g. azo-compounds]
24/14 . . . Peptides; Proteins; Derivatives thereof
24/16 . . . Sulfur-containing compounds
24/161 . . . . . . [Macromolecular compounds comprising sulfonate or sulfate groups]
24/163 . . . . . . [obtained by reactions only involving carbon-to-carbon unsaturated bonds]
24/165 . . . . . . [containing polyether side chains]
24/166 . . . . . . [obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds]
24/168 . . . . . . [Polysaccharide derivatives, e.g. starch sulfate]
24/18 . . . Lignin sulfonic acid or derivatives thereof, e.g. sulfite lye

24/20 . . . Sulfonated aromatic compounds
24/22 . . . . Condensation [or polymerisation] products thereof

NOTE
In this group the following term is used with the meaning indicated:
• "aldehydes" also covers other organic compounds reacting as aldehydes, e.g. glyoxylic acid

24/223 . . . . [Sulfonated melamine-formaldehyde condensation products]
24/226 . . . . [Sulfonated naphthalene-formaldehyde condensation products]
24/24 . . . Macromolecular compounds (C04B 24/14 takes precedence; macromolecular compounds comprising sulfonate or sulfate groups C04B 24/16)
24/243 . . . . [Phosphorus-containing polymers]
24/246 . . . . . [containing polyether side chains]
24/26 . . . obtained by reactions only involving carbon-to-carbon unsaturated bonds {((C04B 24/243 takes precedence))
24/2605 . . . . [containing polyether side chains]
24/2611 . . . . . [Polyalkenes]
24/2617 . . . . . [Coumarone polymers]
24/2623 . . . . . [Polyvinylalcohols; Polyvinylacetates]
24/2629 . . . . . [containing polyether side chains]
24/2635 . . . . . [Polyvinylacetals]
24/2641 . . . . . [Polyacrylates; Polymethacrylates]
24/2647 . . . . . [containing polyether side chains]
24/2652 . . . . . [Nitrogen containing polymers, e.g. polyacrylamides, polyacrylonitriles]
24/2658 . . . . . [containing polyether side chains]
24/2664 . . . . . [of ethylenically unsaturated dicarboxylic acid polymers, e.g. maleic anhydride copolymers]
24/267 . . . . . [containing polyether side chains]
24/2676 . . . . . [Polystyrenes]
24/2682 . . . . . [Halogen containing polymers, e.g. PVC]
24/2688 . . . . . [Copolymers containing at least three different monomers]
24/2694 . . . . . [containing polyether side chains]
24/28 . . . obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds ((C04B 24/243 takes precedence))
24/281 . . . . . [Polyepoxides]
24/282 . . . . . [Polyurethanes; Polyisocyanates]
24/283 . . . . . [Polyesters]
24/285 . . . . . . [Polylactides]
24/286 . . . . . . [Polycarbonates]
24/287 . . . . . . [Polyamides]
24/288 . . . . . [Halogen containing polymers]
24/30 . . . Condensation polymers of aldehydes or ketones

NOTE
In this group the following term is used with the meaning indicated:
• "aldehydes" also covers other organic compounds reacting as aldehydes, e.g. glyoxylic acid

24/302 . . . . . [Phenol-formaldehyde condensation polymers]
24/305 . . . . . [Melamine-formaldehyde condensation polymers]
Use of materials as active ingredients

24/307 . . . . {Urea-formaldehyde condensation polymers}
24/32 . . . . Polyethers, e.g. alkylphenol polyglycol ether
24/34 . . . . Natural resins, e.g. rosin ((C04B 24/24 takes precedence))
24/36 . . . . Bituminous materials, e.g. tar, pitch ((C04B 24/24 takes precedence))
24/38 . . . . Polysaccharides or derivatives thereof ((C04B 24/24 takes precedence))
24/383 . . . . {Cellulose or derivatives thereof}
24/386 . . . . {containing polyether side chains}
24/40 . . . . Compounds containing silicon, titanium or zirconium (or other organo-metallic compounds; Organo-clays; Organo-inorganic complexes)
24/405 . . . . {Organo-inorganic complexes}
24/42 . . . . Organo-silicon compounds
24/425 . . . . {Organo-modified inorganic compounds, e.g. organo-clays}

Compositions of mortars, concrete or artificial stone (artificial stone from molten slag C04B 3/00)

26/00 Compositions of mortars, concrete or artificial stone, containing only organic binders (e.g. polymer or resin concrete (mechanical aspects of moulding polymer or resin concrete B29C 67/242))
26/003 . . . . {Oil-based binders, e.g. containing linseed oil}
26/006 . . . . {Waste materials as binder}
26/02 . . . . Macromolecular compounds
26/023 . . . . {Organic ionomer cements}
26/026 . . . . {Proteins or derivatives thereof}
26/04 . . . . obtained by reactions only involving carbon-to-carbon unsaturated bonds
26/045 . . . . {Polyalkenes}
26/06 . . . . Acrylates
26/08 . . . . containing halogen
26/10 . . . . obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds
26/105 . . . . {Furfuryl alcohol polymers, e.g. furan-polymer}
26/12 . . . . Condensation polymers of aldehydes or ketones

NOTE

In this group the following term is used with the meaning indicated:
- "aldehydes" also covers other organic compounds reacting as aldehydes, e.g. glyoxylic acid

26/122 . . . . {Phenol-formaldehyde condensation polymers}
26/125 . . . . {Melamine-formaldehyde condensation polymers}
26/127 . . . . {Urea formaldehyde condensation polymers}
26/14 . . . . Polyepoxides
26/16 . . . . Polyurethanes
26/18 . . . . Polyster; Polycarbonates
26/20 . . . . Polyamides
26/22 . . . . Natural resins, e.g. rosin
26/24 . . . . Cellulosic waste liquor, e.g. sulfite lye
26/26 . . . . Bituminous materials, e.g. tar, pitch ((C08L 95/00 takes precedence))
26/28 . . . . Polysaccharides or derivatives thereof
26/285 . . . . {Cellulose or derivatives thereof, e.g. starch (C04B 26/24 takes precedence)}

26/30 . . . . Compounds having one or more carbon-to-metal or carbon-to-silicon linkages (: Other silicon-containing organic compounds: Boron-organic compounds)
26/32 . . . . containing silicon

28/00 Compositions of mortars, concrete or artificial stone, containing inorganic binders or the reaction product of an inorganic and an organic binder, e.g. polycarboxylate cements

NOTE

While using Combination Sets in this main group, the presence of an organic binder is indicated with symbols chosen from group C04B 24/00, and the presence of a supplementary inorganic binder with symbols chosen from groups C04B 7/00 - C04B 12/00

28/001 . . . . {containing unburned clay (polymer binder - clay mixtures used in well cementing C09K 8/44)}
28/003 . . . . {containing hybrid binders other than those of the polycarboxylate type}
28/005 . . . . {containing gelatineous or gel forming binders, e.g. gelatineous Al(OH)3, sol-gel binders}
28/006 . . . . {containing mineral polymers, e.g. geopolymers of the Davidovits type}
28/008 . . . . {Mineral polymers other than those of the Davidovits type, e.g. from a reaction mixture containing waterglass}
28/002 . . . . {containing hydraulic cements other than calcium sulfates}
28/021 . . . . {Ash cements, e.g. fly ash cements (fly ash as filler C04B 18/08): Cements based on incineration residues, e.g. alkali-activated slags from waste incineration (alkali-activated combustion residues as such C04B 7/243; mixtures of the lime- pozzolane type C04B 28/18): Kiln dust cements}
28/023 . . . . {Barium cements}
28/025 . . . . {Belite cements}
28/026 . . . . {Oil shale cements}
28/028 . . . . {Alinate cements, i.e. "Nudelman"-type cements}
28/04 . . . . {Portland cements}
28/06 . . . . {Aluminous cements (monolithic refractories or refractory mortars C04B 35/66)}
28/065 . . . . {Calcium aluminosulfate cements, e.g. cements hydrating into ettringite}
28/08 . . . . {Slag cements}
28/082 . . . . {Steelmaking slags; Converter slags}
28/085 . . . . {Slags from the production of specific alloys, e.g. ferrochrome slags}
28/087 . . . . {Phosphorus slags}
28/10 . . . . {Lime cements or magnesium oxide cements}
28/105 . . . . {Magnesium oxide or magnesium carbonate cements}
28/12 . . . . {Hydraulic lime}
28/14 . . . . {containing calcium sulfate cements {(gypsum-paper plates E04C)}}
28/141 . . . . {containing dehydrated gypsum before the final hardening step, e.g. forming a dehydrated gypsum product followed by a de- and rehydration step}
28/142 . . . . {containing synthetic or waste calcium sulfate cements}
Compositions of mortars, concrete or artificial stone

**C04B**

28/143 . . . [the synthetic calcium sulfate being phosphogypsum]

28/144 . . . [the synthetic calcium sulfate being a flue gas desulfurization product]

28/145 . . . [Calcium sulfate hemi-hydrate with a specific crystal form]

28/146 . . . [alpha-hemihydrate]

28/147 . . . [beta-hemihydrate]

28/148 . . . [containing calcium sulfate formed in situ, e.g. by the reaction of iron sulfate with lime]

28/16 . . . containing anhydrite, e.g. Keene's cement

28/165 . . . [containing synthetic anhydrite]

28/18 . containing mixtures of the silica-lime type

28/182 . . . [based on calcium silicate forming mixtures not containing lime or lime producing ingredients, e.g. glass-based mixtures heated with a calcium salt]

28/184 . . . [based on an oxide other than lime]

28/186 . . . [containing formed Ca-silicates before the final hardening step]

28/188 . . . [the Ca-silicates being present in the starting mixture]

28/24 . containing alkyl, ammonium or metal silicates; containing silica sols (reaction mixtures resulting in mineral polymers C04B 28/006; polymeric reaction products of alkali metal silicates with isocyanates C04B 18/3892)

28/26 . Silicates of the alkali metals

28/28 . containing organic polyacids, e.g. polycarboxylate cements, i.e. ionomeric systems

28/30 . containing magnesium cements or similar cements (magnesium oxide cements C04B 28/10)

28/32 . Magnesium oxychloride cements, e.g. Sorel cement

28/34 . containing cold phosphate binders

**NOTE**

While using Combination Sets in this main group, the presence of a reactive or reacted oxide is indicated with symbols chosen from C04B 14/06 and C04B 14/30 (and subgroups), except for boron oxide (C04B 22/0013) and oxides of the alkali or alkaline-earth metals, with the exception of magnesia (C04B 22/062 and C04B 22/064), e.g. a composition containing a mixture of phosphoric acid, AlCr phosphate and magnesium oxide will be classified in C04B 28/346 and will be indexed with codes C04B 14/303, C04B 14/304 and C04B 14/307. "Phosphates" includes monobasic and dibasic phosphates.

28/342 . . . [the phosphate binder being present in the starting composition as a mixture of free acid and one or more reactive oxides]

28/344 . . . [the phosphate binder being present in the starting composition solely as one or more phosphates]

28/346 . . . [the phosphate binder being present in the starting composition as a mixture of free acid and one or more phosphates]

28/348 . . . [the starting mixture also containing one or more reactive oxides]

28/36 . containing sulfur, sulfides or selenium

28/365 . . . [containing sulfides or selenium]

30/00 Compositions for artificial stone, not containing binders

30/02 . containing fibrous materials

32/00 Artificial stone not provided for in other groups of this subclass

32/005 . [Artificial stone obtained by melting at least part of the composition, e.g. metal (C04B 28/36 and C03C take precedence; cast stone from molten slag C04B 5/00; artificial stone obtained by melting the polymeric ingredient of the composition C04B 26/00)]

32/02 . with reinforcements [(contains no documents; reinforcing elements E04C 5/00)]

**NOTE**

This group is only used for indexing purposes.

Ceramics

**33/00 Clay-wares (monolithic refractories or refractory mortars C04B 35/66; porous products C04B 38/00)**

**NOTE**

(In groups C04B 33/00 - C04B 33/36, the indexing codes of groups C04B 22/006 - C04B 22/9646 are used (with the exception of C04B 22/3849, C04B 22/5027, C04B 22/504 and C04B 22/5061) to identify aspects relating to ceramic starting mixtures and sintered ceramic products.)

33/02 . Preparing or treating the raw materials individually or as batches

33/025 . . . [Mixtures of materials with different sizes]

33/04 . . . Clay; Kaolin

33/06 . . . Rendering lime harmless

33/08 . . . Preventing efflorescence

33/10 . . . Eliminating iron or lime

33/13 . . . Compounding ingredients (C04B 33/36, C04B 35/71 take precedence; pigments for ceramics C09C 1/0009)]

33/1305 . . . [Organic additives]

33/131 . . . [Inorganic additives]

33/1315 . . . [Non-ceramic binders]

33/132 . . . Waste materials; Refuse; [Residues]

33/1321 . . . [Waste slurries, e.g. harbour sludge, industrial muds (slurries of specific well-defined waste streams, e.g. phosphate muds, other than red mud, C04B 33/132)]

33/1322 . . . . [Red mud]

33/1324 . . . . [Recycled material, e.g. tile dust, stone waste, spent refractory material]

33/1325 . . . . [Hazardous waste other than combustion residues (dredging sludge C04B 33/1321)]

33/1327 . . . . [containing heavy metals]

33/1328 . . . . [without additional clay]

33/135 . . . . Combustion residues, e.g. fly ash, incineration waste ([silica fume C04B 33/132])

33/1352 . . . . [Fuel ashes, e.g. fly ash]

33/1355 . . . . [Incineration residues]

33/1357 . . . . . [Sewage sludge ash or slag]
35/00  Shaped ceramic products characterised by their composition [{porous ceramic products C04B 38/00; ceramic articles characterised by particular shape, see the relevant classes, e.g. linings for casting ladles, tundishes, cups or the like B22D 41/02; ceramic substrates for microelectronic semi-conductors H01L 23/15}; Ceramics compositions (containing free metal bonded to carbides, diamond, oxides, borides, nitrides, silicides, e.g. cermets, or other metal compounds, e.g. oxynitrides or sulfides other than as macroscopic reinforcing agents C22C.; shaping of ceramics B23B)]; Processing powders of inorganic compounds preparatory to the manufacturing of ceramic products [{chemical preparation of powders of inorganic compounds C01; infiltration of sintered ceramic preforms with molten metal C04B 41/51}]

NOTES
1. In this group, in the absence of an indication to the contrary, compositions are classified according to the constituent present in the highest proportion by weight.
2. In this group, magnesium is considered as an alkaline earth metal.
3. In this group, a composite is considered as a sintered material containing more than one phase, where the secondary phases are not resulting from sintering aids
4. In this group, fine ceramics are considered as products having a polycrystalline, fine-grained microstructure, e.g. of dimensions below 100 micrometers.
5. The production of ceramic powder is classified in this group in so far as it relates to the preparation of powder with specific characteristics.
6. In groups C04B 35/00 - C04B 35/83, from 01-01-2005 onwards, the indexing codes of groups C04B 2235/00 - C04B 2235/9692 are used to identify aspects relating to ceramic starting mixtures and sintered ceramic products

WARNING
Attention is drawn to WARNINGS 3 and 4 after subclass title

35/01  . . . based on oxide ceramics
35/013  . . {containing carbon (C04B 35/103 takes precedence)}

35/016  . . {based on manganites}
35/03  . . based on magnesium oxide, calcium oxide or oxide mixtures derived from dolomite
35/04  . . based on magnesium oxide
35/043  . . . . Refractories from grain sized mixtures
35/0435  . . . . {containing refractory metal compounds other than chromium oxide or chrome ore}
35/047  . . . . containing chromium oxide or chrome ore
35/0473  . . . . {obtained from fused grains}
35/0476  . . . . {obtained from prereacted sintered grains ("simultaneous sinter")}
35/05  . . Refractories by fusion casting
35/051  . . . . {containing chromium oxide or chrome ore}
35/053  . . Fine ceramics
35/057  . . based on calcium oxide
35/06  . . based on oxide mixtures derived from dolomite
35/08  . . based on beryllium oxide
35/10  . . based on aluminium oxide
35/101  . . Refractories from grain sized mixtures
35/1015  . . . . {containing refractory metal compounds other than those covered by C04B 35/103 - C04B 35/106}
35/103  . . containing non-oxide refractory materials, e.g. carbon (C04B 35/106 takes precedence)
35/105  . . containing chromium oxide or chrome ore
35/106  . . containing zirconium oxide or zircon (ZrSiO3)
35/107  . . Refractories by fusion casting
35/109  . . . . containing zirconium oxide or zircon (ZrSiO3)
35/111  . . Fine ceramics
35/1115  . . . . {Minute sintered entities, e.g. sintered abrasive grains or shaped particles such as platelets (abrasives C09K 3/14)}
35/113  . . based on beta-aluminium oxide
35/115  . . Translucent or transparent products
35/117  . . Composites
35/119  . . . . with zirconium oxide
35/12  . . based on chromium oxide (C04B 35/047 and C04B 35/105 take precedence)
35/14  . . based on silica
35/16  . . based on silicates other than clay {(zircon C04B 35/48)}
35/18  . . rich in aluminium oxide
35/185  . . . . Mullite {3Al2O3·2SiO2}
35/19  . . Alkali metal aluminosilicates, e.g. spodumene
35/195  . . . . Alkaline earth aluminosilicates, e.g. cordierite [or anorthite]
35/20  . . rich in magnesium oxide, e.g. forsterite (C04B 35/195 takes precedence)
35/22  . . rich in calcium oxide, e.g. wollastonite (C04B 35/195 takes precedence)
35/26  . . based on ferrites
35/2608  . . {Compositions containing one or more ferrites of the group comprising manganese, zinc, nickel, copper or cobalt and one or more ferrites of the group comprising rare earth metals, alkali metals, alkaline earth metals or lead}
35/2616  . . . . {containing lithium}
35/2625  . . . . {containing magnesium}
Ceramics

zirconates, { zircon } or hafnates

also zirconium or hafnium oxides, zirconates or

based on titanium oxides or titanates ( containing

stannates or bismuthates

based on zinc, tin, or bismuth oxides or solid

- C04B 35/4525

NOTE

In groups C04B 35/4504 - C04B 35/4525 an

invention is classified in the last appropriate

place

35/4504 . . . . [containing rare earth oxides]

35/4508 . . . . [Type 1-2-3]

35/4512 . . . . [containing thallium oxide]

35/4517 . . . . [also containing lead oxide]

35/4521 . . . . [containing bismuth oxide]

35/4525 . . . . [also containing lead oxide]

35/453 . . . based on zinc, tin, or bismuth oxides or solid

solutions thereof with other oxides, e.g. zinctes,

stannates or bismuthates

35/457 . . . based on tin oxides or stannates

35/46 . . . based on titanium oxides or titanates ( containing

also zirconium or hafnium oxides, zirconates or

hafnates C04B 35/49)

35/462 . . . . based on titanates

35/465 . . . . based on alkaline earth metal titanates

35/468 . . . . based on barium titanates

35/4682 . . . . {based on BaTiO₃ perovskite phase}

35/4684 . . . . {containing lead compounds

( C04B 35/472 takes precedence )}

35/4686 . . . . {based on phases other than BaTiO₃,

perovskite phase}

35/4688 . . . . {containing lead compounds

( C04B 35/472 takes precedence )}

35/47 . . . . based on strontium titanates

35/472 . . . . based on lead titanates

35/475 . . . . based on bismuth titanates

35/478 . . . . based on aluminium titanates

35/48 . . based on zirconium or hafnium oxides,

zirconates, [zircon] or hafnates

35/481 . . . . [containing silicon, e.g. zircon]

35/482 . . . . Refractories from grain sized mixtures

35/484 . . . . Refractories by fusion casting

35/486 . . . . Fine ceramics

35/488 . . . . Composites

35/4885 . . . . [with aluminium oxide]

35/49 . . . containing also titanium oxides or titanates

35/491 . . . . based on lead zirconates and lead titanates [ ,

e.g. PZT]

35/493 . . . . containing also other lead compounds

35/495 . . . based on vanadium, niobium, tantalum,

molybdenum or tungsten oxides or solid solutions

thereof with other oxides, e.g. vanadates,

niobates, tantalates, molybdates or tungstates

35/497 . . . . based on solid solutions with lead oxides

35/499 . . . . containing also titanates

35/50 . . . based on rare-earth compounds { (non-oxide rare

earth compounds C04B 35/5156) }

35/505 . . . based on yttrium oxide

35/51 . . . based on compounds of actinides { (non-oxide

actinide compounds C04B 35/5158) : nuclear fuel

materials G21C 3/62}

35/515 . . . based on non-oxide ceramics

35/512 . . . [based on halogenides other than fluorides]

35/5154 . . . [based on phosphides]

35/5156 . . . [based on rare earth compounds]

35/5158 . . . [based on actinide compounds]

35/52 . . . based on carbon, e.g. graphite

35/521 . . . {obtained by impregnation of carbon products

with a carbonisable material}

35/522 . . . [Graphite ( C04B 35/536 takes precedence )]

35/524 . . . obtained from polymer precursors, e.g. glass-

like carbon material

35/528 . . . obtained from carbonaceous particles with or

without other non-organic components

35/53 . . . containing a carbonisable binder

35/536 . . . based on expanded graphite [ or complexed

graphite ]

35/547 . . . based on sulfides or selenides [ or tellurides ]

35/553 . . . based on fluorides

35/56 . . . based on carbides [ or oxycarbides ( containing

free metal binder C22C 29/00 )]

35/5603 . . . [ with a well-defined oxygen content, e.g.

oxycarbides]

35/5607 . . . [based on refractory metal carbides]

35/5611 . . . [based on titanium carbides]

35/5615 . . . [based on titanium silicon carbides]

35/5618 . . . [based on titanium aluminium carbides]

35/5622 . . . [based on zirconium or hafnium carbides]

35/5626 . . . [based on tungsten carbides]

35/563 . . . based on boron carbide

35/565 . . . based on silicon carbide

35/571 . . . obtained from [ Si-containing ] polymer

precursors [ or organosilicon monomers ]

35/573 . . . obtained by reaction sintering [ or

recrystallisation ]

35/575 . . . obtained by pressure sintering

35/5755 . . . [ obtained by gas pressure sintering ]

35/58 . . . based on borides, nitrides, [ i.e. nitrides,

oxynitrides, carbonitrides or oxycarbonitrides ]

or silicides [ ( containing free binder metal

C22C 29/00 )]

35/58007 . . . [based on refractory metal nitrides]

35/58014 . . . [based on titanium nitrides, e.g. TiAlON]

35/58021 . . . [based on titanium carbonitrides]

35/58028 . . . [based on zirconium or hafnium nitrides]
Ceramics

35/6204 . . . . . . (using waste materials or refuse (clay-wares containing waste materials C04B 33/132))
35/6209 . . . . . . (using woody material, remaining in the ceramic products (to obtain porous material by burning out C04B 38/06))
35/6213 . . . . . . (using rice material, e.g. bran or hulls or husks)
35/6218 . . . . . . (obtaining ceramic films, e.g. by using temporary supports)
35/6222 . . . . . . (obtaining ceramic coatings (coating of mortars, concrete, artificial or natural stone or ceramics C04B 41/45; laminated ceramic products B32B 18/00; coating metallic materials C23; coating of glass C03C 17/00, applying ceramic coatings on silicon for semi-conductor purposes H01L))
35/6227 . . . . . . (obtaining fibres)
35/6231 . . . . . . (based on oxide ceramics)
35/6236 . . . . . . (Fibres based on aluminium oxide)
35/624 . . . . . . (Fibres based on silica)
35/6245 . . . . . . (rich in aluminium oxide)
35/625 . . . . . . (Fibres based on zirconium oxide, e.g. zirconates such as PZT)
35/6254 . . . . . . (Fibres based on copper oxide)
35/6259 . . . . . . (Fibres based on titanium oxide)
35/6263 . . . . . . (Fibres based on magnesium oxide)
35/6268 . . . . . . (Fibres based on metal phosphorus oxides, e.g. phosphates)
35/6272 . . . . . . (based on non-oxide ceramics (carbon nanotubes C01B 32/15; carbon fibers D01F 9/12))
35/6277 . . . . . . (Fibres based on carbides)
35/6281 . . . . . . (based on silicon carbide (C04B 35/571 takes precedence))
35/6286 . . . . . . (Fibres based on nitrides)
35/629 . . . . . . (based on boron nitride)
35/6295 . . . . . . (based on silicon nitride (C04B 35/589 takes precedence))
35/624 . . . . . . (Sol-gel processing)
35/626 . . . . . . (Preparing or treating the powders individually or as batches {pigments for ceramics C09C 1/0009}; preparing or treating macroscopic reinforcing agents for ceramic products, e.g. fibres; mechanical aspects section B)

NOTE
In groups C04B 35/622 and subgroups indexing codes are given for aspects relating to the preparation, properties or mechanical treatment or to heat treatments of green bodies. The codes are chosen from C04B 2235/660 - C04B 2235/668

35/6224 . . . . . . (Fibres based on silicon nitride)
35/587 . . . . . . Fine ceramics
35/589 . . . . . . obtained from {Si-containing} polymer precursors {or organosilicon monomers}
35/591 . . . . . . obtained by reaction sintering
35/593 . . . . . . obtained by pressure sintering
35/5935 . . . . . . (obtained by gas pressure sintering)
35/597 . . . . . . based on silicon oxynitride, e.g. SIALONS
35/622 . . . . . . Forming processes; Processing powders of inorganic compounds preparatory to the manufacturing of ceramic products

WARNING
Groups C04B 35/62605 - C04B 35/62695 are not complete, see also other subgroups of C04B 35/000, e.g. C04B 35/626
35/62605 . . . . . . (Treating the starting powders individually or as mixtures)
35/6241 . . . . . . (Milling)
35/62615 . . . . . . (High energy or reactive ball milling)
35/6262 . . . . . . (of calcined, sintered clinker or ceramics)
35/62625 . . . . . . (Wet mixtures)
35/6263 . . . . . . (characterised by their solids loadings, i.e. the percentage of solids)
35/62635 . . . . . . (Mixing details)
35/6264 . . . . . . (Mixing media, e.g. organic solvents)
35/62645 . . . . . . (Thermal treatment of powders or mixtures thereof other than sintering)
35/6265 . . . . . . (involving reduction or oxidation)
35/6255 . . . . . . (Drying, e.g. freeze-drying, spray-drying, microwave or supercritical drying)
35/6266 . . . . . . (Humidity controlled drying)
35/62665 . . . . . . (Flame, plasma or melting treatment)
35/6267 . . . . . . (Pyrolysis, carbonisation or auto-combustion reactions)
35/62675 . . . . . . (characterised by the treatment temperature)
35/6268 . . . . . . (characterised by the applied pressure or type of atmosphere, e.g. in vacuum, hydrogen or a specific oxygen pressure)
35/62685 . . . . . . (characterised by the order of addition of constituents or additives)
35/6269 . . . . . . (Curing of mixtures)
35/6295 . . . . . . (Granulation or pelletising (devices for shaping artificial aggregates from ceramic mixtures B28B 1/004))
35/628 . . . . . . (Coating the powders (or the macroscopic reinforcing agents))
35/62802 . . . . . . (Powder coating materials)
35/62805 . . . . . . (Oxide ceramics)
35/62807 . . . . . . (Silica or silicates)
35/6281 . . . . . . (Alkaline earth metal oxides)
35/62813 . . . . . . (Alumina or aluminates)
35/62815 . . . . . . (Rare earth metal oxides)
35/62818 . . . . . . (Refractory metal oxides)
35/62821 . . . . . . (Titanium oxide)
35/62823 . . . . . . (Zirconium or hafnium oxide)
35/62826 . . . . . . (Iron group metal oxides)
35/62828 . . . . . . . . . . . . . [Non-oxide ceramics]
35/62831 . . . . . . . . . . . . . [Carbides]
35/62834 . . . . . . . . . . . . . [Silicon carbide]
35/62836 . . . . . . . . . . . . . [Nitrides]
35/62839 . . . . . . . . . . . . . [Carbon]
35/62842 . . . . . . . . . . . . . [Metals]
35/62844 . . . . . . . . . . . . . [Coating fibres]
35/62847 . . . . . . . . . . . . . [with oxide ceramics]
35/62849 . . . . . . . . . . . . . [Silica or silicates]
35/62852 . . . . . . . . . . . . . [Alumina or aluminates]
35/62855 . . . . . . . . . . . . . [Refractory metal oxides]
35/62857 . . . . . . . . . . . . . [without non-oxide ceramics]
35/6286 . . . . . . . . . . . . . [Carbides]
35/62863 . . . . . . . . . . . . . [Silicon carbide]
35/62865 . . . . . . . . . . . . . [Nitrides]
35/62868 . . . . . . . . . . . . . [Boron nitride]
35/62871 . . . . . . . . . . . . . [Silicon nitride]
35/62873 . . . . . . . . . . . . . [Carbon]
35/62876 . . . . . . . . . . . . . [with metals]
35/62878 . . . . . . . . . . . . . [with boron or silicon]
35/62881 . . . . . . . . . . . . . [with metal salts, e.g. phosphates]
35/62884 . . . . . . . . . . . . . [by gas phase techniques]
35/62886 . . . . . . . . . . . . . [by wet chemical techniques]
35/62889 . . . . . . . . . . . . . [with a discontinuous coating layer]
35/62892 . . . . . . . . . . . . . [with a coating layer consisting of particles]
35/62894 . . . . . . . . . . . . . [with more than one coating layer]
35/62897 . . . . . . . . . . . . . [Coatings characterised by their thickness]
35/63 . . . . . . . . . . . . . . . using additives specially adapted for forming the products, (e.g., binder binders)
35/6303 . . . . . . . . . . . . . [Inorganic additives]
35/6306 . . . . . . . . . . . . . [Binders based on phosphoric acids or phosphates]
35/6309 . . . . . . . . . . . . . [Aluminium phosphates]
35/6313 . . . . . . . . . . . . . [Alkali metal or alkaline earth metal phosphates]
35/6316 . . . . . . . . . . . . . [Binders based on silicon compounds]
35/632 . . . . . . . . . . . . . . Organic additives
35/6325 . . . . . . . . . . . . . [based on organo-metallic compounds]
35/634 . . . . . . . . . . . . . . Polymers (C04B 35/636 takes precedence)
35/63404 . . . . . . . . . . . . . [obtained by reactions only involving carbon-to-carbon unsaturated bonds]
35/63408 . . . . . . . . . . . . . [Polylekene]
35/63412 . . . . . . . . . . . . . [Coumarone polymers]
35/63416 . . . . . . . . . . . . . [Polyvinylalcohols (PVA); Polyvinylacetates]
35/6342 . . . . . . . . . . . . . [Polyvinylacetals, e.g. polyvinylbutyral (PVB)]
35/63424 . . . . . . . . . . . . . [Polyacrylates; Polymethacrylates]
35/63428 . . . . . . . . . . . . . [of ethylenically unsaturated dicarboxylic acid anhydride polymers, e.g. maleic anhydride copolymers]
35/63432 . . . . . . . . . . . . . [Polystyrenes]
35/63436 . . . . . . . . . . . . . [Halogen-containing polymers, e.g. PVC]
35/6344 . . . . . . . . . . . . . [Copolymers containing at least three different monomers]
35/63444 . . . . . . . . . . . . . [Nitrogen-containing polymers, e.g. polycrylamides, polycyronitriles, polyvinylpyrrolidone (PVP), polyethyleneimine (PEI)]
35/63448 . . . . . . . . . . . . . [obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds]
35/63452 . . . . . . . . . . . . . [Polyepoxides]
35/63456 . . . . . . . . . . . . . [Polyurethanes; Polyisocyanates]
35/6346 . . . . . . . . . . . . . [Polyesters]
35/63464 . . . . . . . . . . . . . [Polycarbongates]
35/63468 . . . . . . . . . . . . . [Polyamides]
35/63472 . . . . . . . . . . . . . [Condensation polymers of aldehydes or ketones]

NOTE
In this group the following term is used with the meaning indicated:
• “aldehydes” also covers other organic compounds reacting as aldehydes, e.g. glyoxylic acid

35/63476 . . . . . . . . . . . . . [Phenol-formaldehyde condensation polymers]
35/6348 . . . . . . . . . . . . . . [Melamine-formaldehyde condensation polymers]
35/63484 . . . . . . . . . . . . . [Urea-formaldehyde condensation polymers]
35/63488 . . . . . . . . . . . . . [Polyethers, e.g. alklyphenol polyglycol ether, polyethylen glycol [PEG], polyethylene oxide [PEO]]
35/63492 . . . . . . . . . . . . . [Natural resins, e.g. rosin]
35/63496 . . . . . . . . . . . . . [Bitumenous materials, e.g. tar, pitch]
35/636 . . . . . . . . . . . . . . Polysaccharides or derivatives thereof
35/6365 . . . . . . . . . . . . . [Cellulose or derivatives thereof]
35/638 . . . . . . . . . . . . . . Removal thereof
35/64 . . . . . . . . . . . . . . Burning or sintering processes (C04B 33/32 takes precedence ; powder metallurgy B22F)]
35/645 . . . . . . . . . . . . . . Pressure sintering
35/65 . . . . . . . . . . . . . . [Hot isostatic pressing]
35/65 . . . . . . . . . . . . . . Reaction sintering of free metal- or free silicon-containing compositions [(C04B 35/573, C04B 35/591 take precedence)]
35/651 . . . . . . . . . . . . . [Thermite type sintering, e.g. combustion sintering]
35/652 . . . . . . . . . . . . . [Directional oxidation or solidification, e.g. Lanzoxid process]
35/653 . . . . . . . . . . . . . Processes involving a melting step
35/657 . . . . . . . . . . . . . [for manufacturing refractories (C04B 35/05, C04B 35/107, C04B 35/484 take precedence)]
35/66 . . . . . . . . . . . . . Monolithic refractories or refractory mortars, including those whether or not containing clay (making or repairing of linings F27D 1/16)]
35/71 . . . . . . . . . . . . . Ceramic products containing macroscopic reinforcing agents (C04B 35/66 takes precedence ; infiltration of a porous ceramic matrix with a material forming a non-ceramic phase C04B 41/00; reaction infiltration with Si in order to form SiC C04B 35/573, in order to form SiN4, C04B 35/591)]

NOTE
In groups C04B 35/71 - C04B 35/83 the composition of the ceramic products is also classified in groups C04B 35/01 - C04B 35/597
35/74 . . . . . . . . . . . . . containing shaped metallic materials
35/76 . . . . . . . . . . . . . Fibres, filaments, whiskers, platelets, or the like
35/78 . . . . . . . . . . . . . containing non-metallic materials
35/80 . . . . . . . . . . . . . Fibres, filaments, whiskers, platelets, or the like [carbon reinforced with carbon fibres see C04B 35/83]
Joining burned ceramic articles with other burned ceramic articles or other articles by heating
(laminated products B32B, E04C; [soldering and welding materials B23K 35/24])

**NOTE**

In groups C04B 37/00 - C04B 37/04 features relating to interlayers, additional compositional information or further processing are indexed with codes chosen from C04B 2237/00 - C04B 2237/88.

**WARNING**

Groups C04B 37/005, C04B 37/006, C04B 37/025 and C04B 37/026 are no longer used for classification as from September 1, 2008. Aspects relating to interlayers are from that date indexed by codes chosen from C04B 2237/02 - C04B 2237/16.

**NOTE**

When classifying in group C04B 38/0019, classification is also made in C04B 28/00 or C04B 37/00 to give detailed information about the composition of the joining material.
NOTE
This group is mainly used for classification using Combination Sets in C04B 38/00.

38/007 [characterised by the pore distribution, e.g. inhomogeneous distribution of pores]

NOTE
This group is mainly used for classification using Combination Sets in C04B 38/00.

38/0074 [expressed as porosity percentage]
38/0077 [Materials with a non-porous skin]
38/008 [Bodies obtained by assembling separate elements having such a configuration that the final product is porous or by spirally winding one or more corrugated sheets]
38/0083 [from one or more corrugated sheets or sheets bearing protrusions by winding or stacking]
38/0087 [by generating pores in the ceramic material while in the molten state]
38/009 [Porous or hollow ceramic granular materials, e.g. microballoons (C04B 18/027, C04B 20/002 take precedence)]
38/0093 [Other features]
38/0096 [Pores with coated inner walls]
38/00 by adding chemical blowing agents
38/0025 [generated by microorganisms]
38/004 by dissolving-out added substances
38/0045 [the dissolved-out substance being a monolithic element having approximately the same dimensions as the final article, e.g. a prepreg obtained by bonding together dissolvable particles (C04B 38/0022 takes precedence)]
38/006 by burning-out added substances [by burning natural expanding materials or by sublimating or melting out added substances]

NOTE
Documents in which the characteristic feature is the choice of meltable or sublimable material or the physical aspects of the porous body obtained are classified accordingly, and symbols C04B 38/0605 or C04B 38/061 are allocated in Combination Sets.

38/0063 [Preparing or treating the raw materials individually or as batches]
38/00635 [Compounding ingredients (C04B 38/0615 takes precedence)]
38/0064 [Natural expanding materials, e.g. clay]

38/0065 [characterised by physical aspects, e.g. shape, size or porosity]

NOTE
Documents having this group as classification symbol or as part of a Combination Set can also get symbol C04B 38/0051 in the Combination Set, if the importance of the size of the pores obtained is emphasized.

38/0069 [Other materials, e.g. catalysts (C04B 33/13, C04B 35/00 take precedence)]
38/00695 [Physical aspects of the porous material obtained]

38/00 by adding porous substances
38/0085 [of micro- or nanosize]
38/10 by using foaming agents (C04B 38/02 takes precedence) [by using mechanical means, e.g. adding preformed foam]
38/0103 [the foaming being obtained by the introduction of a gas other than untreated air, e.g. nitrogen]
38/106 [by adding preformed foams]

40/00 Processes, in general, for influencing or modifying the properties of mortars, concrete or artificial stone compositions, e.g. their setting or hardening ability (active ingredients C04B 22/00 - C04B 24/00; hardening of a well-defined composition C04B 26/00 - C04B 28/00; making porous, cellular or lightening C04B 38/00; mechanical aspects B28, e.g. conditioning the materials prior to shaping B28B 17/02)
Selection of the hardening environment

NOTE

In this group the following term is used with the meaning indicated:

• “hardening” covers also setting, pre-curing and curing

NOTE

Compositions with prolonged pot-life are not classified here.

They are classified as other compositions and the symbol C04B 2111/00086 is allocated in Combination Set.

NOTE

In group C04B 41/00, the following terms or expressions are used with the meanings indicated:

• “mortars”, “concrete” and “artificial stone” cover materials after primary shaping
After-treatment of mortars, concrete, artificial stone or ceramics; Treatment of natural stone (conditioning of the materials prior to shaping C04B 40/00; applying liquids or other fluent materials to surfaces, in general B05; grinding or polishing B24; apparatus or processes for treating or working shaped articles of clay or other ceramic compositions, slag or mixtures containing cementitious material B28B 11/00; working stone or stone-like materials B28D; glazes, other than cold glazes, C03C 8/00; etching, surface-brightening or pickling compositions C09K 13/00)

NOTES

1. In this group, multiple classification is made according to the following rules:
   - when the substrate to be treated is of the artificial stone type, e.g. concrete, classification is made in the range C04B 41/00 - C04B 41/5392 as well as in the range C04B 41/60 - C04B 41/72
   - when the substrate to be treated is of the ceramic type, classification is made in the range C04B 41/00 - C04B 41/5392 as well as in the range C04B 41/80 - C04B 41/91
   - when the substrate to be treated is a-specific, classification is made only in the range C04B 41/00 - C04B 41/5392

2. In groups C04B 41/0018 - C04B 41/53, in the absence of an indication to the contrary, classification is made in the last appropriate place.

3. Treating, e.g. coating or impregnating, a material with the same material or with a substance which ultimately is transformed into the same material is not considered after-treatment for this group but is classified as preparation of the material, e.g. a carbon body impregnated with a carbonisable substance is classified in C04B 35/52.

4. In groups C04B 41/00 - C04B 41/53, it is desirable to add the indexing codes relating to the nature of the substrate being treated. The indexing codes, which are chosen from groups C04B 26/00 - C04B 38/00 should be unlinked.

5. In groups C04B 41/00 - C04B 41/53, it is desirable to add the indexing codes relating to aspects of the coating composition or to the method of application. The indexing codes, which are chosen from groups C04B 41/00 - C04B 41/5392 should be unlinked.

6. Attention is drawn to internal Note (2) following the title of subclass C04B.

41/0045 . [Irradiation; Radiation, e.g. with UV or IR (C04B 41/0036 takes precedence)]
41/0054 . [Plasma-treatment, e.g. with gas-discharge plasma]
41/0063 . [Cooling, e.g. freezing]

NOTE

In this group the term “cooling” is used in the sense of an additional cooling treatment, different from the traditional cooling step in the fabrication of materials involving a heating step, such as sintering of ceramics

41/0072 . [Heat treatment]
41/0081 . [characterised by the subsequent cooling step]
41/009 . [characterised by the material treated]
41/45 . Coating or impregnating (paints C09D). {e.g. injection in masonry, partial coating of green or fired ceramics, organic coating compositions for adhering together two concrete elements (ion-implantation C04B 41/0027)}

NOTES

1. In group C04B 41/45 and sub-groups, as a general rule, classification is made according to the end products, rather than according to the starting materials, in the coating or impregnating compositions.

2. In groups C04B 41/45 - C04B 41/528 the following term is used with the meaning indicated:
   - “coating” covers material applied to the substrates as powdery material or applied from the gas or liquid phase, e.g. as a slurry; it only covers the use of preformed sheet-like elements in so far as the thickness of these sheets is small compared with the thickness of the substrate and so far as the resulting product is not exclusively one of the type classifiable in B32B

41/4501 . . [with preformed sheet-like elements]
41/4503 . . [having an adhesive layer]
41/4505 . . [characterised by the method of application]
41/4507 . . . [using keying elements, e.g. particulate material, to facilitate the adherence of coating layers]
41/4509 . . . . [The keying element being generated from identations made in the substrate]
41/4511 . . . . [using temporarily supports, e.g. decalcomania transfers or mould surfaces]
41/4513 . . . . [the temporary support- and coating material being mixed together, e.g. tile glazing paper sheets]
41/4515 . . . . . [application under vacuum or reduced pressure]
41/4517 . . . . . [application under inert, e.g. non-oxidising, atmosphere]
41/4519 . . . . . [application under an other specific atmosphere]
41/4521 . . . . . [application under increased pressure]

41/0009 . [Demolition agents based on cementitious or like materials]

NOTE

Products classified in group C04B 41/009 should also be classified according to their composition, e.g. in C04B 28/00

41/0018 . [Coating or impregnating "in situ", e.g. impregnating of artificial stone by subsequent melting of a compound added to the artificial stone composition]
41/0027 . [Ion-implantation, ion-irradiation or ion-injection]
41/0036 . [Laser treatment (working by laser beam B23K 26/00)]
41/4523 . . . [applied from the molten state (vitreous materials C04B 41/5022); Thermal spraying, e.g. plasma spraying]

**NOTE**
Coating or impregnating with a specific material in the molten state is classified according to the specific material and get symbol C04B 41/4523 in Combination Sets

41/4525 . . . . [using a molten bath as vehicle, e.g. molten borax]

41/4527 . . . . {Plasma spraying (deposition from the gas phase using plasma C04B 41/4533)}

41/4529 . . . . [applied from the gas phase]

**NOTE**
Coating or impregnating with a specific material from the gas phase is classified according to the specific material and symbol C04B 41/4529 is allocated in Combination Sets

41/4531 . . . . [by C.V.D.]
41/4533 . . . . [plasma assisted]
41/4535 . . . . [applied as a solution, emulsion, dispersion or suspension]

**NOTE**
Coating or impregnating with a solution or a suspension of a specific material is classified according to the specific material and symbol C04B 41/4535 is allocated in Combination Sets

41/4537 . . . . {by the sol-gel process}
41/4539 . . . . {as a emulsion, dispersion or suspension}
41/4541 . . . . {Electroless plating}
41/4543 . . . . {by spraying, e.g. by atomising}
41/4545 . . . . [applied as a powdery material]

**NOTE**
Coating or impregnation with a specific powdery material is classified according to the specific material and symbols C04B 41/4545 - C04B 41/4549 are allocated in Combination Sets

41/4547 . . . . [characterised by the grain distribution]
41/4549 . . . . {Nanometer-sized particles}
41/455 . . . . {the coating or impregnating process including a chemical conversion or reaction}
41/4552 . . . . {the end product being obtained by a multistep reaction or conversion}
41/4554 . . . . {the coating or impregnating material being an organic or organo-metallic precursor of an inorganic material}
41/4556 . . . . {coating or impregnating with a product reacting with the substrate, e.g. generating a metal coating by surface reduction of a ceramic substrate}
41/4558 . . . . {Coating or impregnating involving the chemical conversion of an already applied layer, e.g. obtaining an oxide layer by oxidising an applied metal layer}

41/456 . . . . . {the conversion only taking place under certain conditions, e.g. avoiding damage of underlaying layers or parts of the substrate}

41/4562 . . . . {Photographic methods, e.g. making use of photo-sensitive materials}
41/4564 . . . . {Electrolytic or electrophoretic processes, e.g. electrochemical re-alkalisation of reinforced concrete (desalination C04B 41/53)}
41/4566 . . . . {Electrochemical re-alkalisation (electrochemical desalination C04B 41/5369; cathodic protection C23F 13/02)}
41/4568 . . . . {Electrostatic processes}
41/457 . . . . . {Non-superficial impregnation or infiltration of the substrate}
41/4572 . . . . {Partial coating or impregnation of the surface of the substrate}
41/4574 . . . . {Coating different parts of the substrate with different materials}
41/4576 . . . . {Inlaid coatings, i.e. resulting in a plane surface}
41/4578 . . . . {Coating or impregnating of green ceramics or unset concrete}
41/458 . . . . . {involving a mixing step with the top layer of the substrate}
41/4582 . . . . {Porous coatings, e.g. coating containing porous fillers}
41/4584 . . . . {Coating or impregnating of particulate or fibrous ceramic material (C04B 20/10, C04B 35/628 take precedence)}
41/4586 . . . . {Non-chemical aspects relating to the substrate being coated or impregnated}
41/4588 . . . . {Superficial melting of the substrate before or during the coating or impregnating step}
41/459 . . . . . {Temporary coatings or impregnations (C04B 40/04 takes precedence)}
41/4592 . . . . {for masking purposes}
41/4594 . . . . {in metallisation processes}
41/4596 . . . . {with fibrous materials or whiskers}
41/4598 . . . . {with waste materials}
41/46 . . . . . {with organic materials}
41/463 . . . . . {Organic solvents}
41/466 . . . . . {Halogenated compounds, e.g. perfluorocompounds}
41/47 . . . . . {Oils, fats or waxes [natural resins]}
41/472 . . . . . {Oils, e.g. linseed oil}
41/474 . . . . . {Natural resins, e.g. rosin}
41/476 . . . . . {Cellulosic waste liquor, e.g. sulfite lye}
41/478 . . . . . {Bitumen, asphalt, e.g. paraffin}
41/48 . . . . . {Macromolecular compounds}
41/4803 . . . . {Polysaccharides, e.g. cellulose, or derivatives thereof}
41/4807 . . . . {Proteins or derivatives thereof}
41/4811 . . . . {Condensation polymers of aldehydes or ketones}

**NOTE**
In this group the following term is used with the meaning indicated:
- “aldehydes” also covers other organic compounds reacting as aldehydes, e.g. glyoxylic acid
Ceramics

C04B

41/4815 . . . . . . . (Melamine-formaldehyde condensation products)
41/4819 . . . . . . . (Urea-formaldehyde condensation products)
41/4823 . . . . . . . [Phenol-formaldehyde condensation products]
41/4826 . . . . . . . (Polysteresters)
41/483 . . . . . . . (Polycarboxylates)
41/4834 . . . . . . . (Polyacrylamides)
41/4838 . . . . . . . (Halogenated polymers)
41/4842 . . . . . . . (Fluorine-containing compounds)
41/4846 . . . . . . . {Perfluoro-compounds}
41/4849 . . . . . . . (Sulfur-containing polymers)
41/4853 . . . . . . . (Epoxides)
41/4857 . . . . . . . [Other macromolecular compounds obtained by reactions only involving carbon-to-carbon unsaturated bonds]
41/4861 . . . . . . . (Polyalkenes)
41/4865 . . . . . . . (Coumarone polymers)
41/4869 . . . . . . . (Polyvinylalcohols, polyvinylacetates)
41/4873 . . . . . . . (Polyvinylacetals)
41/4876 . . . . . . . (Polystyrene)
41/488 . . . . . . . [Other macromolecular compounds obtained otherwise than by reactions only involving unsaturated carbon-to-carbon bonds]
41/4884 . . . . . . . (Polyurethanes; Polysicocyanates)
41/4888 . . . . . . . (Polyacrylates)
41/4892 . . . . . . . (Polyamides)
41/4896 . . . . . . . (Polyethers)
41/49 . . . . . . . Compounds having one or more carbon-to-metal or carbon-to-silicon linkages {Organo-clay compounds; Organo-silicates, i.e. ortho- or polysilicic acid esters (to obtain SiO2: C04B 41/5089, C04B 41/5035); Organo-phosphorus compounds; Organo-inorganic complexes}

NOTE
As distinct from the general practice in C04B 41/00, classification in C04B 41/49 and sub-groups is done according to the nature of the starting products, not according to the nature of the end products

41/4905 . . . . . . . [containing silicon]
41/4911 . . . . . . . [Organo-clay compounds]
41/4916 . . . . . . . [applied to the substrate as a solventless liquid]
41/4922 . . . . . . . [applied to the substrate as monomers, i.e. as organosilanes RnSiX4-n, e.g. alkyltrialkoxyxilane, dialkylxiloxysilane]
41/4927 . . . . . . . [Alkali metal or ammonium salts]
41/4933 . . . . . . . [containing halogens, i.e. organohalogen silanes]
41/4938 . . . . . . . [containing silicon bound to hydroxy groups, e.g. trimethyl silanol]
41/4944 . . . . . . . [containing atoms other than carbon, hydrogen, oxygen, silicon, alkali metals or halogens, e.g. N-silyldisilazane; Image]
41/495 . . . . . . . [applied to the substrate as oligomers or polymers]
41/4955 . . . . . . . [Polysiloxanols, i.e. polymers with a Si-Si-Si-chain]
41/4961 . . . . . . . [Polysiloxanols, i.e. polymers with a Si-O-Si-O-chain; "silicones"]
41/4966 . . . . . . . [containing silicon bound to hydroxy groups, i.e. OH-blocked polysiloxanols]
41/4972 . . . . . . . [Alkali metal or ammonium salts]
41/4977 . . . . . . . [characterised by the number of silicon atoms]
41/4983 . . . . . . . [Polycarboxilanes, i.e. polymers with a -Si-C-Si-chain; Polysilazanes, i.e. polymers with a -Si-N-Si-chain; Polysilathianes, i.e. polymers with a -Si-Si-chain]
41/4988 . . . . . . . [Organosilicium-organic copolymers, e.g. olefins with terminal silane groups]
41/4994 . . . . . . . [Organo-phosphorus compounds]
41/50 . . . . . . . with inorganic materials
41/5001 . . . . . . . [with carbon or carbonisable materials]
41/5002 . . . . . . . [Diamond]
41/5003 . . . . . . . [Fullerenes or derivatives thereof]
41/5005 . . . . . . . [Carbon fluorides; Halogen containing carbon or graphite intercallation products]
41/5006 . . . . . . . [Boron compounds]
41/5007 . . . . . . . [with salts or salty compositions, e.g. for salt glazing (C04B 41/5006 takes precedence)]
41/5009 . . . . . . . [containing nitrogen in the anion, e.g. nitrites]
41/501 . . . . . . . [containing carbon in the anion, e.g. carbonates]
41/5011 . . . . . . . [containing halogen in the anion]
41/5012 . . . . . . . [chlorides]
41/5014 . . . . . . . [containing sulfur in the anion, e.g. sulfides]
41/5015 . . . . . . . [containing phosphorus in the anion, e.g. phosphates]
41/5016 . . . . . . . [Acids]
41/5018 . . . . . . . [with fluorine compounds]
41/5019 . . . . . . . [applied from the gas phase, e.g. ocration]
41/502 . . . . . . . [Water]
41/5022 . . . . . . . [with vitreous materials (composition of vitreous glazes and enamels C03C; ceramic pigments C09C 1/0009)]

NOTE
Glazing of concrete, natural or artificial stone or ceramics is only classified in C04B 41/5022 when non-compositional aspects are important, e.g. aspects relating to the method of application or the choice of the substrate

41/5023 . . . . . . . [Glass-ceramics (compositions of glass-ceramics C03C 10/00)]
41/5024 . . . . . . . [Silicates (C04B 41/502 takes precedence; silico-fluorides C04B 41/5018)]
41/5025 . . . . . . . [with ceramic materials (copper oxide or solid solutions thereof C04B 41/5074)]

NOTE
In this subgroup, the materials considered as ceramic materials are those covered by groups C04B 33/00 - C04B 35/83
Ceramics

41/5027 . . . [Oxide ceramics in general; Specific oxide ceramics not covered by C04B 41/5029 - C04B 41/5051]
41/5028 . . . [Manganese]
41/5029 . . . [Magnesia]
41/5031 . . . [Alumina]
41/5032 . . . [Aluminates (aluminate spinels C04B 41/5046)]
41/5033 . . . [Chromium oxide]
41/5035 . . . [Silica]
41/5036 . . . [Ferrites]
41/5037 . . . [Clay, Kaolin]
41/5038 . . . [Porcelain]
41/504 . . . [Engobes]
41/5041 . . . [Titanium oxide or titanates]
41/5042 . . . [Zirconium oxides or zirconates; Hafnium oxides or hafnates]
41/5044 . . . [Hafnates]
41/5045 . . . [Rare-earth oxides]
41/5046 . . . [Spinels, e.g. magnesium aluminate spinels]
41/5048 . . . [Phosphates]
41/5049 . . . [Zinc or bismuth oxides]
41/505 . . . [Tin oxide]
41/5051 . . . [Niobium oxides or niobates]
41/5053 . . . [non-oxide ceramics (carbon or carbonisable materials C04B 41/5001)]
41/5054 . . . [Sulfides or selenides]
41/5055 . . . [Fluorides]
41/5057 . . . [Carbides]
41/5058 . . . [Boron carbide]
41/5059 . . . [Silicon carbide]
41/5061 . . . [Titanium carbide]
41/5062 . . . [Borides, Nitrides or Silicides]
41/5063 . . . [Aluminium nitride]
41/5064 . . . [Boron nitride]
41/5066 . . . [Silicon nitride]
41/5067 . . . [Silicon oxynitrides, e.g. SIALON]
41/5068 . . . [Titanium nitride]
41/507 . . . [Borides]
41/5071 . . . [Silicides]
41/5072 . . . [with oxides or hydroxides not covered by C04B 41/5025 (C04B 40/0236 takes precedence; boron oxide C04B 41/5006)]
41/5074 . . . [Copper oxide or solid solutions thereof (CuO-Cu eutectic C04B 41/5127)]
41/5075 . . . [Copper oxide]
41/5076 . . . [with masses bonded by inorganic cements (sulfur compositions C04B 41/5097)]
41/5077 . . . [Geopolymer cements]
41/5079 . . . [Portland cements]
41/508 . . . [Aluminous cements]
41/5081 . . . [Calcium alumino sulfate cements]
41/5083 . . . [Slag cements]
41/5084 . . . [Lime, hydraulic lime or magnesia oxide cements]
41/5085 . . . [Calcium sulfate cements]
41/5087 . . . [Anhydrite]
41/5088 . . . [Cementitious compositions of the silica-lime type]
41/5089 . . . [Silica sols, alkyl, ammonium or alkali metal silicate cements]
41/509 . . . [Magnesium cements, e.g. Sorel cement]
41/5092 . . . [Phosphate cements]
41/5093 . . . [with elements other than metals or carbon (treatment with fluorine gas C04B 41/5019)]
41/5094 . . . [Boron]
41/5096 . . . [Silicon (C04B 35/573 takes precedence)]
41/5097 . . . [Sulfur]
41/5098 . . . [Cermets]
41/51 . . . Metallising, e.g. infiltration of sintered ceramic preforms with molten metal (covering materials with metals in general C23C; ceramic compositions containing free metal bonded to carbides, diamond, oxides, borides, nitrides, silicides, e.g. cermets, or other metal compounds, e.g. oxynitrides or sulfides, other than as macroscopic reinforcing agents C22C; infiltration of preforms containing free metal, e.g. cermets C22C)]
41/5105 . . . [with a composition mainly composed of one or more of the noble metals or copper]
41/5111 . . . [Ag, Au, Pd, Pt or Cu]
41/5116 . . . [Ag or Au]
41/5122 . . . [Pt or Pd]
41/5127 . . . [Cu, e.g. Cu-CuO eutectic]
41/5133 . . . [with a composition mainly composed of one or more of the refractory metals]
41/5138 . . . [with a composition mainly composed of Mn and Mo, e.g. for the Moly-manganese method]
41/5144 . . . [with a composition mainly composed of one or more of the metals of the iron group]
41/515 . . . [Other specific metals]
41/5155 . . . [Aluminium]
41/5161 . . . [Ti]
41/5166 . . . [Lead]
41/5172 . . . [Cadmium]
41/5177 . . . [characterised by the non-metallic part of the metallising composition]
41/5183 . . . [inorganic]
41/5188 . . . [organic]
41/5194 . . . [Metallisation of multilayered ceramics, e.g. for the fabrication of multilayer ceramic capacitors]
41/52 . . . Multiple coating or impregnating [multiple coating or impregnating with the same composition or with compositions only differing in the concentration of the constituents, is classified as single coating or impregnation]

NOTES

1. Multiple coating or impregnation with the same composition or with compositions only differing in the concentration of the constituents, is classified as single coating or impregnation and symbol C04B 41/52 is allocated in Combination Sets
2. Groups C04B 41/522 and C04B 41/524 are used for Combination Sets only of documents classified in C04B 41/52
41/522 . . . [Multiple coatings, for one of the coatings of which at least one alternative is described]
41/524 . . . [Multiple coatings, comprising a coating layer of the same material as a previous coating layer]
&lt;CERAMICS\&gt; . . . [Multiple coating or impregnation with materials having the same composition but different characteristics]

41/528 . . . [Applying layers containing opposite charged particles or materials in the successive layers]

41/53 . . . involving the removal of at least part of the materials of the treated article, (e.g. etching, drying of hardened concrete (C04B 41/0036 - C04B 41/0054 take precedence))

41/5307 . . . [Removal of physically bonded water, e.g. drying of hardened concrete (E04B 1/7007 takes precedence)]

41/5315 . . . [Cleaning compositions, e.g. for removing hardened cement from ceramic tiles]

41/5323 . . . [to make grain visible, e.g. for obtaining exposed aggregate concrete]

41/533 . . . [Seeding methods, i.e. the exposed aggregates, at least partially, not making part of the starting mixture]

41/5338 . . . [Etching (for obtaining decorative effects B44C 1/22; etching of specific electronic compounds, see the relevant places, e.g. etching of semiconductor bodies H01L 21/306)]

41/5346 . . . [Dry etching]

41/5353 . . . [Wet etching, e.g. with etchants dissolved in organic solvents]

41/5361 . . . [Etching with molten material]

41/5369 . . . [Desalination, e.g. of reinforced concrete]

41/5376 . . . [Electrochemical desalination (electrochemical re-alkalisation C04B 41/4566; drying by electro-osmosis E04B 1/7007)]

41/5384 . . . [by burning (C04B 38/06 takes precedence)]

41/5392 . . . [by burning (C04B 38/06 takes precedence)]

41/60 . of only artificial stone

41/61 . . . Coating or impregnation

41/62 . . . with organic materials

41/63 . . . Macromolecular compounds

41/64 . . . Compounds having one or more carbon-to-metal of carbon-to-silicon linkages

41/65 . . . with inorganic materials

41/66 . . . Fluorides, e.g. ochratron

41/67 . . . Phosphates

41/68 . . . Silicic acid; Silicates

41/69 . . . Metals

41/70 . . . for obtaining at least two superposed coatings having different compositions

41/71 . . . at least one coating being an organic material

41/72 . . . involving the removal of part of the materials of the treated articles, e.g. etching

41/80 . . . of only ceramics

41/81 . . . Coating or impregnation

41/82 . . . with organic materials

41/83 . . . Macromolecular compounds

41/84 . . . Compounds having one or more carbon-to-metal of carbon-to-silicon linkages

41/85 . . . with inorganic materials

41/86 . . . Glazes; Cold glazes

41/87 . . . Ceramics

41/88 . . . Metals

41/89 . . . for obtaining at least two superposed coatings having different compositions

41/90 . . . at least one coating being a metal

41/91 . . . involving the removal of part of the materials of the treated articles, e.g. etching

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2103/00 Function or property of ingredients for mortars, concrete or artificial stone

2103/0001 . . . [Living organisms, e.g. microorganisms, or enzymes]

2103/0002 . . . [Seeds]

2103/0003 . . . [Unintentionally added compounds, such as impurities in raw materials, e.g. alkali sulfates in construction grade cement]

2103/0004 . . . [Compounds chosen for the nature of their cations]

2103/0005 . . . [Organic ammonium compounds]

2103/0006 . . . [Alkali metal or inorganic ammonium compounds]

2103/0007 . . . [K]

2103/0008 . . . [Li]

2103/0009 . . . [Inorganic ammonium compounds]

2103/001 . . . [Alkaline earth metal or Mg-compounds]

2103/0011 . . . [Ba]

2103/0012 . . . [Mg]

2103/0013 . . . [Iron group metal compounds]

2103/0014 . . . [Fe]

2103/0015 . . . [Noble metal or copper compounds]

2103/0016 . . . [Cu]

2103/0017 . . . [Refactory metal compounds]

2103/0018 . . . [Cr]

2103/0019 . . . [Ti]

2103/002 . . . [Compounds of elements having a valency of 2]

2103/0021 . . . [Compounds of elements having a valency of 3]

2103/0022 . . . [Compounds of elements having a valency of 4]

2103/0023 . . . [Compounds of elements having a valency of 5]

2103/0024 . . . [Compounds of elements having a valency of 6]

2103/0025 . . . [Compounds of the transition metals]

2103/0026 . . . [Compounds of unusual isotopes, e.g. heavy water]

2103/0027 . . . [Standardised cement types]

2103/0028 . . . [according to API]

2103/0029 . . . [Type A]

2103/003 . . . [Type B]

2103/0031 . . . [Type C]

2103/0032 . . . [Type D]

2103/0033 . . . [Type E]

2103/0034 . . . [Type F]

2103/0035 . . . [Type G]

2103/0036 . . . [Type H]

2103/0037 . . . [Type J]

2103/0038 . . . [Type K]

2103/0039 . . . [according to ASTM]

2103/004 . . . [according to DIN]

2103/0041 . . . [Non-polymeric ingredients chosen for their physico-chemical characteristics]

2103/0042 . . . [Amorphous materials]

2103/0043 . . . [Compounds chosen for their specific Moh's hardness]

2103/0044 . . . [Compounds chosen for their abrasion resistance, e.g. determined according to the L.A. test]

2103/0045 . . . [Polymers chosen for their physico-chemical characteristics]

2103/0046 . . . [added as monomers or as oligomers]

2103/0047 . . . [as a mixture of monomers and prepolymer or oligomers]
NOTE

Code C04B 2103/0088 is only used when the chemical nature of the latent hydraulic material is not specified, when no specific group in subclass C04B exists for defining the material or when it is chosen from an important number of alternatives.
2111/00 Mortars, concrete or artificial stone or mixtures to prepare them, characterised by specific function, property or use

2111/00008 . . . [Obtaining or using nanotechnology related materials]
2111/00017 . . . [Aspects relating to the protection of the environment]
2111/00025 . . . [Aspects relating to the protection of the health, e.g. materials containing special additives to afford skin protection (avoiding chromium eczema by using chromium VI-free or very low chromium VI-content materials C04B 2111/00181)]
2111/00043 . . . [Physico-chemical characteristics of the mixtures]
2111/00045 . . . [Anhydrous mixtures]

**NOTE**

Code C04B 2111/00043 is only used in combination with groups C04B 26/00 - C04B 26/32.

2111/00051 . . . [Mortar or concrete mixtures with an unusual low cement content, e.g. for foundations]
2111/0006 . . . [for obtaining materials with the consistency of soil]
2111/00068 . . . [Mortar or concrete mixtures with an unusual water/cement ratio]
2111/00077 . . . [Partially hardened mortar or concrete mixtures]
2111/00086 . . . [Mixtures with prolonged pot-life]
2111/00094 . . . [Sag-resistant materials]
2111/00103 . . . [Self-compacting mixtures]
2111/00112 . . . [Mixtures characterised by specific pH values]
2111/0012 . . . [Thixotropic mixtures]
2111/00129 . . . [Extrudable mixtures]
2111/00137 . . . [Injection moldable mixtures]
2111/00146 . . . [Sprayable or pumpable mixtures]
2111/00155 . . . [Sprayable, i.e. concrete-like, materials able to be shaped by spraying instead of by casting, e.g. gunite]
2111/00163 . . . [by the dry process]
2111/00172 . . . [by the wet process]
2111/00181 . . . [Mixtures specially adapted for three-dimensional printing (3DP), stereo-lithography or prototyping]
2111/00189 . . . [Compositions or ingredients of the compositions characterised by analysis-spectra, e.g. NMR]
2111/00198 . . . [Characterisation or quantities of the compositions or their ingredients expressed as mathematical formulae or equations]
2111/00206 . . . [Compositions defined by their elemental analysis]
Compositions or ingredients thereof characterised by the absence or the very low content of a specific material

Absence of well-defined organic compounds

Organic solvents

Gypsum free or very low gypsum content cement compositions

Alkali-free or very low alkali-content materials

Lime-free or very low lime-content materials

Cement free compositions, e.g. hydraulically hardening mixtures based on waste materials, not containing cement as such

Calciumaluminate-free refractories

Alumina-free or very low alumina-content materials

Silica-free or very low silica-content materials

Halogen free or very low halogen-content materials

Chromium-free or very low chromium-content materials

Chromium VI, e.g. for avoiding chromium eczema (materials containing special additives for affording skin protection C04B 2111/00025)

Carbon free or very low carbon content fly ashes; Fly ashes treated to reduce their carbon content or the effect thereof

Reducing the effect of the carbon content, without removing the carbon

Absence of mineral fibres, e.g. asbestos

Mineral fibres other than asbestos

Resistance against chemical, physical or biological attack

Avoiding unauthorised or unwanted use or treatment

Sulfate resistance

Resistance against alkali-aggregate reaction

Oil-proof or grease-repellant materials

Resistance against physical degradation

Shock-absorbing materials

Earthquake- or hurricane-resistant materials

Materials containing photocatalysts, e.g. TiO$_2$, for avoiding staining by air pollutants or the like

Self cleaning materials, e.g. using lotus effect (using photocatalysts C04B 2111/0061)

Discolouring resistant materials (self cleaning materials C04B 2111/0061)

Thermal shock resistance

Resistance against biological degradation

Efflorescence resistance

Carbonation resistance

Acid resistance, e.g. against acid air or rain

Sea water resistance

Graffiti resistance; Graffiti removing

Corrosion of reinforcement resistance

Cathodic protection of reinforced concrete structures

Water resistance, e.g. waterproof or water-repellant materials

Making materials water insoluble
2111/28 . Fire resistance, i.e. materials resistant to accidental fires or high temperatures
2111/285 . [Intumescent materials]
2111/29 . [Frost-thaw resistance]
2111/30 . Nailable or sawable materials
2111/32 . Expansion-inhibited materials
2111/325 . [the expansion being inhibited in one direction only]
2111/34 . Non-shrinking or non-cracking materials
2111/343 . [Crack resistant materials]
2111/346 . [Materials exhibiting reduced plastic shrinkage cracking]
2111/40 . Porous or lightweight materials
2111/42 . Floating materials
2111/50 . Flexible or elastic materials

**NOTE**

- "flexibility" means ability to bend without breaking;
- "elasticity" means property to resist and recover from deformation produced by a force.

2111/503 . [Elastic materials]
2111/506 . [Bendable material]
2111/52 . Sound-insulating materials
2111/54 . Substitutes for natural stone, artistic materials or the like
2111/542 . [Artificial natural stone]
2111/545 . [Artificial marble]
2111/547 . [Imitating ancient compositions, e.g. mediaeval mortars; Compositions specially designed for restauration of ancient buildings or building elements]
2111/56 . Compositions suited for fabrication of pipes, e.g. by centrifugal casting, or for coating concrete pipes
2111/60 . Flooring materials
2111/62 . Self-levelling compositions
2111/70 . Grouts, e.g. injection mixtures for cables for prestressed concrete
2111/72 . Repairing or restoring existing buildings or building materials
2111/723 . [Repairing reinforced concrete]
2111/726 . [by chemical conversion of unwanted deposits, e.g. for the restauration of marble monuments]
2111/74 . Underwater applications
2111/76 . Use at unusual temperatures, e.g. sub-zero
2111/763 . [High temperatures]
2111/766 . [Low temperatures, but above zero]
2111/80 . Optical properties, e.g. transparency or reflectibility
2111/802 . [White cement]
2111/805 . [Transparent material]
2111/807 . [Luminescent or fluorescent materials]
2111/82 . Coloured materials
2111/90 . Electrical properties
2111/905 . [Anti-static materials]
2111/92 . Electrically insulating materials
2111/94 . Electrically conducting materials

**2201/00** Mortars, concrete or artificial stone characterised by specific physical values

**NOTE**

Indexing codes **C04B 2201/05 - C04B 2201/30** are only to be used when the specific physical values are claimed or when they deviate considerably from the average usual values.

2201/05 . Materials having an early high strength, e.g. allowing fast demoulding or formless casting
2201/10 . for the viscosity
2201/20 . for the density
2201/30 . for heat transfer properties such as thermal insulation values, e.g. R-values
2201/32 . for the thermal conductivity, e.g. K-factors
2201/40 . for gas flow through the material
2201/50 . for the mechanical strength
2201/52 . High compression strength concretes, i.e. with a compression strength higher than about 55 N/mm², e.g. reactive powder concrete [RPC]

**2235/00** Aspects relating to ceramic starting mixtures or sintered ceramic products

**NOTE**

In this group, magnesium is considered as an alkaline earth metal.

2235/02 . Composition of constituents of the starting material or of secondary phases of the final product

**NOTE**

Indexing codes **C04B 2235/02 - C04B 2235/5481** are to be used only if the aspect is not trivial or not standard, e.g. if water is used as a mixing medium for a powder, whereas normally an organic mixing medium is used or if not the standard alpha-alumina is used to make an alumina ceramic but gamma-alumina in stead.

2235/30 . Constituents and secondary phases not being of a fibrous nature

**NOTES**

1. **Indexing codes** **C04B 2235/30 - C04B 2235/549** are to be given to constituents or additives only if:
   a. it is not obvious from the end product as such that the constituent or additive has been used for making the end product. Examples:
      • in case spinel is made from a certain clay in stead of from alumina and silica, the clay is coded,
      • when calcium zirconate and titania are used to make calcium zirconium titanate, a code should be given for the calcium zirconate constituent while normally calcium oxide or calcium carbonate and zirconia are used.

The titania constituent of the starting mixture is not coded since it is to be expected that a single metal oxide is used to make a mixed metal oxide.
b. it is not obvious from the "invention information" symbols that this constituent has been used to make the end product, e.g. if the "invention information" symbol given indicates that a zirconia-alumina composite is prepared it is common practice that zirconia and alumina constituents have been used and thus no codes for zirconia or alumina are given. In the same way, if an allocation indicates that an oxide ceramic contains carbon, no code for the addition of carbon is given. However for an alumina composite product comprising titania, the main symbol for composites based on alumina is given together with an indexing code for titania.

2. In groups C04B 2235/32 - C04B 2235/349 oxides are considered to comprise also metal salts from which they are formed by heating.

**NOTE**

In groups C04B 2235/32 - C04B 2235/349 metal salts are classified according to the oxides that are formed by heating the metal salts.

2235/32 . . . . . . . . . . Metal oxides, mixed metal oxides, or oxide-forming salts thereof, e.g. carbonates, nitrates, (oxy)hydroxides, chlorides

2235/3201 . . . . . . . Alkali metal oxides or oxide-forming salts thereof
2235/3203 . . . . . . . Lithium oxide or oxide-forming salts thereof
2235/3205 . . . . . . . Alkaline earth oxides or oxide forming salts thereof, e.g. beryllium oxide
2235/3206 . . . . . . . Magnesium oxides or oxide-forming salts thereof
2235/3208 . . . . . . . Calcium oxide or oxide-forming salts thereof, e.g. lime
2235/321 . . . . . . . Dolomites, i.e. mixed calcium magnesium carbonates
2235/3212 . . . . . . . Calcium phosphates, e.g. hydroxyapatite
2235/3213 . . . . . . . Strontium oxides or oxide-forming salts thereof
2235/3215 . . . . . . . Barium oxides or oxide-forming salts thereof
2235/3217 . . . . . . . Aluminium oxide or oxide forming salts thereof, e.g. bauxite, alpha-alumina
2235/3218 . . . . . . . Aluminium (oxy)hydroxides, e.g. boehmite, gibbsite, alumina sol
2235/322 . . . . . . . Transition aluminas, e.g. delta or gamma aluminas
2235/3222 . . . . . . . Aluminates other than alumino-silicates, e.g. spinel (MgAl₂O₄)
2235/3224 . . . . . . . Rare earth oxide or oxide forming salts thereof, e.g. scandium oxide
2235/3225 . . . . . . . Yttrium oxide or oxide-forming salts thereof
2235/3227 . . . . . . . Lanthanum oxide or oxide-forming salts thereof
2235/3229 . . . . . . . Cerium oxides or oxide-forming salts thereof
2235/3231 . . . . . . . Refractory metal oxides, their mixed metal oxides, or oxide-forming salts thereof

2235/3232 . . . . . . . Titanium oxides or titanates, e.g. rutile or anatase
2235/3234 . . . . . . . Titanates, not containing zirconia
2235/3236 . . . . . . . Alkaline earth titanates
2235/3237 . . . . . . . Substoichiometric titanium oxides, e.g. Ti₃O₇
2235/3239 . . . . . . . Vanadium oxides, vanadates or oxide forming salts thereof, e.g. magnesium vanadate
2235/3241 . . . . . . . Chromium oxides, chromates, or oxide-forming salts thereof
2235/3243 . . . . . . . Chromates or chromites, e.g. aluminum chromate, lanthanum strontium chromite
2235/3244 . . . . . . . Zirconium oxides, zirconates, hafnium oxides, hafnates, or oxide-forming salts thereof
2235/3246 . . . . . . . Stabilised zirconias, e.g. YSZ or cerium stabilised zirconia
2235/3248 . . . . . . . Zirconates or hafnates, e.g. zircon
2235/3249 . . . . . . . containing also titanium oxide or titanates, e.g. lead zirconate titanate (PZT)
2235/3251 . . . . . . . Niobium oxides, niobates, tantalum oxides, tantalates, or oxide-forming salts thereof
2235/3253 . . . . . . . Substoichiometric niobium or tantalum oxides, e.g. NbO
2235/3255 . . . . . . . Niobates or tantalates, e.g. silver niobate
2235/3256 . . . . . . . Molybdenum oxides, molybdates or oxide forming salts thereof, e.g. cadmium molybate
2235/3258 . . . . . . . Tungsten oxides, tungstanes, or oxide-forming salts thereof
2235/326 . . . . . . . Tungstates, e.g. scheelite
2235/3262 . . . . . . . Manganese oxides, manganates, rhenium oxides or oxide-forming salts thereof, e.g. MnO
2235/3263 . . . . . . . Mn₃O₄
2235/3265 . . . . . . . Mn₂O₃
2235/3267 . . . . . . . MnO₂
2235/3268 . . . . . . . Manganates, manganites, rhenates or rhenites, e.g. lithium manganite, barium manganate, rhenium oxide
2235/327 . . . . . . . Iron group oxides, their mixed metal oxides, or oxide-forming salts thereof
2235/3272 . . . . . . . Iron oxides or oxide forming salts thereof, e.g. hematite, magnetite
2235/3274 . . . . . . . Ferrites
2235/3275 . . . . . . . Cobalt oxides, cobaltates or cobaltalites or oxide forming salts thereof, e.g. bismuth cobaltate, zinc cobaltalite
2235/3277 . . . . . . . Co₃O₄
2235/3279 . . . . . . . Nickel oxides, nickalates, or oxide-forming salts thereof
2235/3281 . . . . . . . Copper oxides, cuprates or oxide-forming salts thereof, e.g. CuO or Cu₂O
2235/3282 . . . . . . . Cuprates
2235/3284 . . . . . . . Zinc oxides, zinicates, cadmium oxides, cadmates, mercury oxides, mercurates or oxide forming salts thereof
2235/3286 . . . . . . . Gallium oxides, gallates, indium oxides, indates, thallium oxides, thallates or oxide forming salts thereof, e.g. zinc gallate
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2235/3287 . . . . . . Germanium oxides, germanates or oxide forming salts thereof, e.g. copper germanate 2235/3856 . . . . . . Carbonitrides, e.g. titanium carbonitride, zirconium carbonitride

2235/3289 . . . . . . Noble metal oxides 2235/386 . . . . . . Boron nitrides
2235/3291 . . . . . . Silver oxides 2235/3865 . . . . . . Aluminium nitrides
2235/3293 . . . . . . Tin oxides, stannates or oxide forming salts thereof, e.g. indium tin oxide [ITO] 2235/3869 . . . . . . Aluminium oxynitrides, e.g. AlON, silalon
2235/3294 . . . . . . Antimony oxides, antimonates, antimononites or oxide forming salts thereof, indium antimonate 2235/3873 . . . . . . Silicon nitrides, e.g. silicon carbonitride, silicon oxynitride
2235/3296 . . . . . . Lead oxides, plumbates or oxide forming salts thereof, e.g. silver plumbate 2235/3878 . . . . . . Alpha silicon nitrides
2235/3298 . . . . . . Bismuth oxides, bismuthates or oxide forming salts thereof, e.g. zinc bismuthate 2235/3882 . . . . . . Beta silicon nitrides
2235/34 . . . . Non-metal oxides, non-metal mixed oxides, or salts thereof that form the non-metal oxides upon heating, e.g. carbonates, nitrates, (oxy)hydroxides, chlorides 2235/3886 . . . . . . Refractory metal nitrides, e.g. vanadium nitride, tungsten nitride
2235/3409 . . . . . . Boron oxide, borates, boric acids, or oxide forming salts thereof, e.g. borax 2235/3891 . . . . . . Silicides, e.g. molybdenum disilicide, iron silicide
2235/3418 . . . . . . Silicon oxide, silicic acids, or oxide forming salts thereof, e.g. silica sol, fused silica, silica fume, cristobalite, quartz or flint (glass constituents C04B 2235/36) 2235/3895 . . . . . . Non-oxides with a defined oxygen content, e.g. SiOC, TiON
2235/3427 . . . . . . Silicates other than clay, e.g. water glass 2235/40 . . . . Metalic constituents or additives not added as binding phase
2235/3436 . . . . . . Alkaline earth metal silicates, e.g. barium silicate 2235/401 . . . . . . Alkaline earth metals
2235/3445 . . . . . . Magnesium silicates, e.g. forsterite 2235/402 . . . . . . Aluminium
2235/3454 . . . . . . Calcium silicates, e.g. wollastonite 2235/404 . . . . . . Refractory metals
2235/3463 . . . . . . Alumino-silicates other than clay, e.g. mullite 2235/405 . . . . . . Iron group metals
2235/3472 . . . . . . Alkali metal alumino-silicates other than clay, e.g. spodumene, alkali feldspars such as albite or orthoclase, micas such as muscovite, zeolites such as natrolite 2235/407 . . . . . . Copper
2235/3481 . . . . . . Alkaline earth metal alumino-silicates other than clay, e.g. cordierite, beryl, micas such as margarite, plagioclase feldspars such as anorthite, zeolites such as chabazite 2235/408 . . . . . . Noble metals
2235/349 . . . . . . Clays, e.g. bentonites, smectites such as montmorillonite, vermiculites or kaolines, e.g. illite, talc or sepiolite 2235/42 . . . . Non metallic elements added as constituents or additives, e.g. sulfur, phosphor, selenium or tellurium
2235/36 . . . . Glass starting materials for making ceramics, e.g. silica glass 2235/421 . . . . . . Boron
2235/365 . . . . . . Borosilicate glass 2235/422 . . . . . . Carbon
2235/38 . . . . . . Non-oxide ceramic constituents or additives 2235/424 . . . . . . Carbon black
2235/3804 . . . . . . Borides 2235/425 . . . . . . Graphite
2235/3808 . . . . . . Magnesium borides 2235/427 . . . . . . Diamond
2235/3813 . . . . . . Refractory metal borides 2235/428 . . . . . . Silicon
2235/3817 . . . . . . Carbides 2235/44 . . . . Metal salt constituents or additives chosen for the nature of the anions, e.g. hydrides or acetylacetonate
2235/3821 . . . . . . Boron carbides 2235/441 . . . . . . Alkoxides, e.g. methoxide, tert-butoxide
2235/3826 . . . . . . Silicon carbides 2235/442 . . . . . . Carbonates
2235/383 . . . . . . Alpha silicon carbide 2235/443 . . . . . . Nitrates or nitrates
2235/3834 . . . . . . Beta silicon carbide 2235/444 . . . . . . Halide containing anions, e.g. bromide, iodate, chlorite
2235/3839 . . . . . . Refractory metal carbides 2235/445 . . . . . . Fluoride containing anions, e.g. fluorosilicate
2235/3843 . . . . . . Titanium carbides 2235/446 . . . . . . Sulfides, tellurides or selenides
2235/3847 . . . . . . Tungsten carbides 2235/447 . . . . . . Phosphates or phosphites (calcium phosphates C04B 2235/3212), e.g. orthophosphate, hypophosphate
2235/3852 . . . . . . Nitrides, e.g. oxynitrides, carbonitrides, oxycarbonitrides, lithium nitride, magnesium nitride 2235/448 . . . . . . Sulphates or sulphites
2235/3856 . . . . . . Carbonitrides, e.g. titanium carbonitride, zirconium carbonitride 2235/449 . . . . . . Organic acids, e.g. EDTA, citrate, acetate, oxalate
2235/45 . . . . . . Gases other than oxygen used as reactant, e.g. nitrogen used to make a nitride phase 2235/465 . . . . . . Ammonia
2235/48 . . . . . . Organic compounds becoming part of a ceramic after heat treatment, e.g. carbonising phenol resins

NOTE
When indexing in group C04B 2235/3856 indexing according to the metal is also made in groups C04B 2235/3865 - C04B 2235/3886

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Aspects relating to the preparation, properties or shape or their physical appearance

Constituents or additives of the starting mixture

Gel casting
Extrusion moulding

Particle size related information

Shapes

Crystallite size or primary particle size

Monomodal
Bimodal, multi-modal or multi-fraction

Micron
Millimeter or submillimeter sized, i.e. larger than 0,1 mm

Flakes, platelets or plates

Hollow fibers, e.g. nanotubes

Spheres

Silica and alumina, including aluminosilicates, e.g. mullite
Silica or silicates other than aluminosilicates, e.g. quartz
Zirconia
Non-oxidic, e.g. borides, carbides, silicides or nitrides
Silicon carbide
Carbon, e.g. graphite
Two-dimensional, e.g. woven structures
characterised by the length of the fibers
characterised by the diameter of the fibers
Orientation of the fibers
Fibers of the same material with different length or diameter
Whiskers, spindles, needles or pins
Spheres
Hollow fibers, e.g. nanotubes
Carbon nanotubes
Flakes, platelets or plates

with a defined aspect ratio, e.g. indicating sphericity (spherical constituents C04B 2235/528)

Particle size related information

expressed by specific surface values
expressed by the size of the particles or aggregates thereof
millimeter or submillimeter sized, i.e. larger than 0,1 mm
micrometer sized, i.e. from 1 to 100 micron
submicron sized, i.e. from 0,1 to 1 micron
nanometer sized, i.e. below 100 nm
Particle size distributions
Bimodal, multi-modal or multi-fraction
Monomodal
the particle size being expressed by crystallite size or primary particle size

Aspects relating to the preparation, properties or mechanical treatment of green bodies or pre-forms

Making the green bodies or pre-forms by moulding
Extrusion moulding
Injection moulding
Gel casting
Tape casting, e.g. with a doctor blade

Constituents or additives characterised by their shapes

Monocrystalline powders
Fibers
Organic
Inorganic
Oxic
Alumina or aluminates
Silica and alumina, including aluminosilicates, e.g. mullite
Silica or silicates other than aluminosilicates, e.g. quartz
Zirconia
Non-oxidic, e.g. borides, carbides, silicides or nitrides
Silicon carbide
Carbon, e.g. graphite
Two-dimensional, e.g. woven structures
characterised by the length of the fibers
characterised by the diameter of the fibers
Orientation of the fibers
Fibers of the same material with different length or diameter
Whiskers, spindles, needles or pins
Spheres
Hollow fibers, e.g. nanotubes
Carbon nanotubes
Flakes, platelets or plates

with a defined aspect ratio, e.g. indicating sphericity (spherical constituents C04B 2235/528)

Particle size related information

expressed by specific surface values
expressed by the size of the particles or aggregates thereof
millimeter or submillimeter sized, i.e. larger than 0,1 mm
micrometer sized, i.e. from 1 to 100 micron
submicron sized, i.e. from 0,1 to 1 micron
nanometer sized, i.e. below 100 nm
Particle size distributions
Bimodal, multi-modal or multi-fraction
Monomodal
the particle size being expressed by crystallite size or primary particle size

Aspects relating to the preparation, properties or mechanical treatment of green bodies or pre-forms

Making the green bodies or pre-forms by moulding
Extrusion moulding
Injection moulding
Gel casting
Tape casting, e.g. with a doctor blade

Constituents or additives of the starting mixture

Gel casting
Extrusion moulding

Particle size related information

Shapes

Crystallite size or primary particle size

Monomodal
Bimodal, multi-modal or multi-fraction

Micron
Millimeter or submillimeter sized, i.e. larger than 0,1 mm

Flakes, platelets or plates

Hollow fibers, e.g. nanotubes

Spheres

Silica and alumina, including aluminosilicates, e.g. mullite
Silica or silicates other than aluminosilicates, e.g. quartz
Zirconia
Non-oxidic, e.g. borides, carbides, silicides or nitrides
Silicon carbide
Carbon, e.g. graphite
Two-dimensional, e.g. woven structures
characterised by the length of the fibers
characterised by the diameter of the fibers
Orientation of the fibers
Fibers of the same material with different length or diameter
Whiskers, spindles, needles or pins
Spheres
Hollow fibers, e.g. nanotubes
Carbon nanotubes
Flakes, platelets or plates

with a defined aspect ratio, e.g. indicating sphericity (spherical constituents C04B 2235/528)

Particle size related information

expressed by specific surface values
expressed by the size of the particles or aggregates thereof
millimeter or submillimeter sized, i.e. larger than 0,1 mm
micrometer sized, i.e. from 1 to 100 micron
submicron sized, i.e. from 0,1 to 1 micron
nanometer sized, i.e. below 100 nm
Particle size distributions
Bimodal, multi-modal or multi-fraction
Monomodal
the particle size being expressed by crystallite size or primary particle size

Aspects relating to the preparation, properties or mechanical treatment of green bodies or pre-forms

Making the green bodies or pre-forms by moulding
Extrusion moulding
Injection moulding
Gel casting
Tape casting, e.g. with a doctor blade
Products characterised by their size, e.g. silicon content

Physical characteristics

Products with a concentration gradient

Crystal structural characteristics, e.g. symmetry

NOTE
Codes C04B 2235/76 - C04B 2235/768 are to be used only if the crystal structure is not identified by the classification.

Unit-cell parameters, e.g. lattice constants

Cubic symmetry, e.g. beta-SiC

Spinel structure AB₂O₄

Garnet structure A₃B₂(CO₄)₃

Trigonal symmetry, e.g. alpha-Si₃N₄ or alpha-Sialon

Hexagonal symmetry, e.g. alpha-Si₃N₄, beta-Sialon, alpha-SiC or hexa-ferrites

Perovskite structure ABO₃

Density

Products showing a density-gradient

Grain sizes and shapes, product microstructures, e.g. acicular grains, equiaxed grains, platelet-structures

Nanograined materials, i.e. having grain sizes below 100 nm

Grain size distributions

Bimodal, multi-modal or multi-fractional

Monomodal

Submicron sized grains, i.e. from 0.1 to 1 micron

Micrometer sized grains, i.e. from 1 to 100 micron

Oriented grains

Aspect ratio of the grains

Non-stoichiometric products, e.g. perovskites (ABO₃) with an A/B-ratio other than 1

Phases present in the sintered or melt-cast ceramic products other than the main phase

NOTES
1. In this group the term "phases other than the main phase" refers to any phase that is not the main phase, i.e. the phase that is present in the largest amount.
2. Codes chosen from groups C04B 2235/30 - C04B 2235/5296 are used for identifying the phases other than the main phase.

Materials characterised by the absence of phases other than the main phase, i.e. single phase materials

Ferrites containing Fe₂⁺

Intergranular or grain boundary phases

Grain boundary phases intentionally being absent

Products characterised by their shape

Products containing grooves, cuts, recesses or protusions

Products characterised by their size, e.g. microceramics

Properties of ceramic products, e.g. mechanical properties such as strength, toughness, wear resistance

NOTE
Codes C04B 2235/96 - C04B 2235/9692 are to be used only if the property is not identified already by an "invention information" symbol, e.g. by a symbol out of subclass H01N, indicating that the ceramic is dielectric, piezoelectric or magnetic.

Thermal properties, e.g. thermal expansion coefficient

Linear firing shrinkage

Ceramic setters properties

Surface properties, e.g. surface roughness

Tolerance; Dimensional accuracy

Optical properties

Translucent or transparent ceramics other than alumina

Colour

Resistance against chemicals, e.g. against molten glass or molten salts

against molten metals such as steel or aluminium

Oxidation resistance

Acid, alkali or halogen resistance

Aspects relating to ceramic laminates or to joining of ceramic articles with other articles by heating

Aspects relating to interlayers, e.g. used to join ceramic articles with other articles by heating

Ceramic interlayers

Oxidic interlayers

based on silica or silicates

based on alumina or aluminates

based on rare earth oxides

based on refractory oxides, e.g. zirconia

Non-oxidic interlayers

Carbide interlayers, e.g. silicon carbide interlayers

Carbon interlayers

wherein the active component for bonding is not the largest fraction of the interlayer

The active component for bonding being silicon

Glass interlayers, e.g. frit or flux

Metallic interlayers

based on aluminium

based on refractory metals

based on iron group metals, e.g. steel

based on copper

based on noble metals, e.g. silver

wherein the active component for bonding is not the largest fraction of the interlayer

The active component for bonding being a refractory metal

The active component for bonding being silicon

Silicon interlayers

Composition of layers of ceramic laminates or of ceramic or metallic articles to be joined by heating, e.g. Si substrates
Processing aspects relating to ceramic laminates or articles properties across the laminate or the joined sintering active joining layer other than oxidation treatment in order to form an
Pre-treatments of a coated or not coated substrate Oxidising the surface before joining cleaning, machining
Pre-treatment of the joining surfaces, e.g. iron metal group, e.g. Co or Ni Refractory metals Cermets
Ceramic is covered by the interlayer not the whole surface of the smallest substrate whereby the interlayer is not continuous, e.g. not the whole surface of the smallest substrate is covered by the interlayer
Non-oxidic
by heating at least one member being a tube
at least one member containing a channel or other types of openings whereby the interlayer is continuous but porous, e.g. containing hollow or porous particles, macro- or micropores or cracks
Joining two substrates of which at least one is porous by infiltrating the porous substrate with a liquid, such as a molten metal, causing bonding of the two substrates, e.g. joining two porous carbon substrates by infiltrating with molten silicon parts of macro-size, e.g. one ceramic substrate layer containing an embedded conductor or electrode Non-oxidic
Processing aspects relating to ceramic laminates or to the joining of ceramic articles with other articles by heating
Pre-treatment of the joining surfaces, e.g. cleaning, machining by heating
Oxidising the surface before joining Pre-treatments of a coated or not coated substrate other than oxidation treatment in order to form an active joining layer on a substrate not containing an interlayer coating, leading to the formation of an interlayer coating Using constraining layers before or during sintering Constraining layers not covering the whole surface of the layers to be sintered, e.g. constraining layers with holes made of alumina or aluminates made of glass made of refractory metal oxides, e.g. zirconia made of metal made of non-oxide ceramics Forming a gradient in composition or in properties across the laminate or the joined articles by joining layers or articles of the same composition but having different additives the different additives being fibers or whiskers by joining layers or articles of the same composition but having different densities by joining layers or articles of the same composition but having different particle or grain sizes Aspects relating to the structure of the interlayer whereby the interlayer is not continuous, e.g. not the whole surface of the smallest substrate is covered by the interlayer
Organisational aspects of production methods, equipment or plants
2290/10  . Business methods aspects
2290/20  . Integrated combined plants or devices, e.g. combined foundry and concrete plant