CPC  COOPERATIVE PATENT CLASSIFICATION

C  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 2103/00 - C04B 2111/00.

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:

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C04B  
(continued)  

2. 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 11/22)]

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 (decarbonation during burning of cement raw materials C04B 7/43; (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 alkaline raw materials (C04B 7/60 takes precedence)

7/12 . Natural pozzolanas; Natural pozzuolan cements; {Artificial pozzolanas or artificial pozzuolan cements other than those obtained from waste or combustion residues, e.g. burnt 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

7/1535 . . . . [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, KühI cements]

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

7/243 . . . [Mixtures thereof with activators or composition-correcting 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 fly 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 aluminohalide 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 . . . [Alilite cements, e.g. "Nudelman"-type cements, bromo-alilite cements, (fluoro-alilite 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

7/365 . . . . [by extracting part of the material from the process flow and returning it into the process after a separate treatment, e.g. in a separate retention unit under specific conditions]

7/367 . . . . [Avoiding or minimising carbon dioxide emissions]

7/368 . . . . [Obtaining spherical cement particles]

7/38 . . . . Preparing or treating the raw materials individually or as batches, e.g. mixing with fuel; (C04B 7/362 takes precedence)

7/40 . . . . Dehydrating; Forming, e.g. granulating (apparatus for granulating B01J 2/00)

7/42 . . . . Active ingredients added before, or during, the burning process (after the burning process C04B 22/00, C04B 24/00)

7/421 . . . . [Inorganic materials]

7/422 . . . . . . [Elements]

7/424 . . . . . . [Oxides, Hydroxides]

7/425 . . . . . . [Acids or salts thereof]

7/427 . . . . . . [Silicates]

7/428 . . . . . . [Organic materials]

7/43 . . . . Heat treatment, e.g. precalcining, burning, melting; Cooling (aspects only relating to the installation F27B)

7/432 . . . . [Preheating without addition of fuel]

7/434 . . . . [Preheating with addition of fuel, e.g. calcining]

7/436 . . . . [Special arrangements for treating part or all of the cement kiln dust]

7/438 . . . . [Evacuating at least part of the heat treated material before the final burning or melting step, the evacuated material being used as a cement as such]

7/44 . . . . Burning; Melting

7/4407 . . . . [Treatment or selection of the fuel therefor, e.g. use of hazardous waste as secondary fuel (fuels in general C10L); Use of particular energy sources, e.g. waste hot gases from other processes]

7/4415 . . . . [Waste hot gases]

7/4423 . . . . [Waste or refuse used as fuel]

7/443 . . . . [Tyres, e.g. shredded]

7/4438 . . . . [the fuel being introduced directly into the rotary kiln]

7/4446 . . . . [the fuel being treated in a separate gasifying or decomposing chamber, e.g. a separate combustion chamber]

7/4453 . . . . [using plasmas or radiations]

7/4461 . . . . [Grate sintering]

7/4469 . . . . [in shaft or vertical kilns]

7/4476 . . . . [Selection of the kiln atmosphere]

7/4484 . . . . [Non-electric melting]

7/4492 . . . . [Inhibiting the formation of or eliminating incrustations in the cement kiln (removing incrustations from rotary-drum furnaces F27B 7/2075)]

7/45 . . . . in fluidised beds, e.g. spouted beds]

7/46 . . . . electric

7/47 . . . . Cooling; Waste heat management

7/475 . . . . [using the waste heat, e.g. of the cooled clinker, in an other way than by simple heat exchange in the cement production line, e.g. for generating steam]

7/48 . . . . Clinker treatment (C04B 7/47 takes precedence)

7/51 . . . . Hydrating

7/52 . . . . Grinding; After-treatment of ground cement

7/522 . . . . [After-treatment of ground cement (C04B 7/368 takes precedence)]

7/525 . . . . [Briquetting]

7/527 . . . . [obtaining cements characterised by fineness, e.g. by multi-modal particle size distribution]

7/60 . . . . Methods for eliminating alkali metals or compounds thereof, e.g. from the raw materials or during the burning process; methods for eliminating other harmful components (avoiding environmental pollution C04B 7/364)]

9/00 Magnesium cements or similar cements

9/02 . . . . Magnesium cements containing chlorides, e.g. Sorel cement

9/04 . . . . Magnesium cements containing sulfates, nitrates, phosphates or fluorides

9/06 . . . . Magnesium cements containing metal compounds other than magnesium compounds, e.g. compounds of zinc or lead

9/11 . . . . Mixtures thereof with other inorganic cementitious materials

9/12 . . . . with hydraulic cements, e.g. Portland cements

9/20 . . . . Manufacture, e.g. preparing the batches (preheating, burning, calcining or cooling lime stone, magnesite or dolomite C04B 2/10)

11/00 Calcium sulfate cements

11/002 . . . . [Mixtures of different CaSO₄-modifications, e.g. plaster of Paris and anhydrite, used as cements]

11/005 . . . . [Preparing or treating the raw materials]

11/007 . . . . [After-treatment of the dehydration products, e.g. aging, stabilisation]

11/02 . . . . [Methods and apparatus for] dehydrating gypsum (for other purposes than cement manufacture C01F 11/466)]

11/022 . . . . [Simultaneous dehydrating of gypsum and slaking of lime]

11/024 . . . . Ingredients added before, or during, the calcining process, e.g. calcination modifiers

11/028 . . . . Devices therefor, characterised by the type of calcining devices used therefor or by the type of hemihydrate obtained]

11/0281 . . . . [Kettles; Marmites; Autoclaves]

11/0282 . . . . [Autoclaves, e.g. using chariots]

11/0283 . . . . [Fluidised beds]

11/0285 . . . . [Rotary kilns]

11/0286 . . . . [Suspension heaters for flash calcining, e.g. cyclones]

11/0287 . . . . [Multi-storey horizontal furnaces]

11/0288 . . . . [Grates]

11/032 . . . . for the wet process, e.g. dehydrating in solution or under saturated vapour conditions, i.e. to obtain alpha-hemihydrate (C04B 11/0281 - C04B 11/0288 take precedence)]

11/036 . . . . [for the dry process, e.g. dehydrating in a fluidised bed or in a rotary kiln, i.e. to obtain beta-hemihydrate (C04B 11/0281 - C04B 11/0288 take precedence)]

11/05 . . . . obtaining anhydrite, e.g. Keene's cement (C04B 11/028 takes precedence)
14/06 . . . starting from anhydrite
11/26 . . . {strating 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 . . . Alkal 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, 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 20/00)

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 . . . {Attapulgite clay}
14/104 . . . {Bentonite, e.g. montmorillonite}
14/106 . . . {Kaolin}
14/108 . . . {Shale, slat (colliery shale C04B 18/125)}
14/12 . . . Expanded clay
14/14 . . . Minerals of vulcanic 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 . . . of calcium
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

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.
| 18/06 | 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 |
| 18/061 | Combustion residues, e.g. purification products of smoke, fumes or exhaust gases |
| 18/062 | [Ashes from fluidised bed furnaces] |
| 18/063 | [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 | [Slates, mining or the like] |
| 18/125 | [Slate residues, e.g. colliery shale or oil shale or oil shale ash] |
| 18/14 | [Municipal waste] |
| 18/141 | (C04B 18/10 takes precedence) |
| 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] |
| 18/166 | [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 16/068) |
| 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 theferefor] |
| 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 |
| 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] |
| 20/004 | [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] |
| 20/008 | [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] |
| 2002 | Treatment |
Use of materials as fillers

**Use of materials as active ingredients**

**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.

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

22/0006 . . . [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. nitrates]
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 fillers**

Use of materials as fillers.
Use of materials as active ingredients

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 . . . [Halogен-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 . . . [Amines]
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 naphtalene-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 . . . . [Cumarone polymers]
24/2623 . . . . [Polyvinylalcohols; Polyvinylacetates]
24/2629 . . . . [containing polyether side chains]
24/2635 . . . . [Polyvinylacetals]
24/2641 . . . . [Polycracylates; Polymethacrylates]
24/2647 . . . . [containing polyether side chains]
24/2652 . . . . [Nitrogen containing polymers, e.g. polyacrylamides, polyacyronitriles]
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 . . . . [Polyolefins]
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 . . . . [Polypepoxides]
24/282 . . . . [Polyurethanes; Polyisocyanates]
24/283 . . . . [Polyesters]
24/285 . . . . [Polyalactides]
24/286 . . . . [Polycarbonates]
24/287 . . . . [Polymides]
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

Compositions of mortars, concrete or artificial stone (artificial stone from molten slag C04B 26/00)

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 . . . . Polyoxides
26/16 . . . . Polyurethanes
26/18 . . . . Polysteres; 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
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 Davydovits type)
28/008 . . . . (Mineral polymers other than those of the Davydovits type, e.g. from a reaction mixture containing waterglass)
28/02 . . . . 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 combustion residues as such C04B 7/243; mixtures of the lime-pozzolane type C04B 28/18); Klin dust cements)
28/023 . . . . (Barium cements)
28/025 . . . . (Belite cements)
28/026 . . . . (Oil shale cements)
28/028 . . . . (Alinite 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 dihydrated gypsum before the final hardening step, e.g. forming a dihydrated 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

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 C04C 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 2235/00 - C04B 2235/964 are used (with the exception of C04B 2235/349, C04B 2235/6027, C04B 2235/604 and C04B 2235/661) 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)
33/130 Organic additives
33/131 Inorganic additives
33/1315 Non-ceramic binders
33/132 Waste materials; Refuse; [Residues] (C04B 33/16 takes precedence; [waste glass C04B 33/13])
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

...
33/138 . . . from metallurgical processes, e.g. slag, furnace dust, galvanic waste
33/14 . . . Colouring matters
33/16 . . . Lean materials, e.g. grog, quartz
33/18 . . . for liquefying the batches
33/20 . . . for dry-pressing (C04B 33/13 takes precedence)
33/22 . Grog products
33/24 . Manufacture of porcelain or white ware
33/26 . . . of porcelain for electrical insulation
33/28 . Slip casting (mechanical features B28B 1/26)
33/30 . Drying methods
33/32 . Burning methods
33/323 . . . {involving melting, fusion or softening}
33/326 . . . {under pressure}
33/34 . . . combined with glazing
33/36 . Reinforced clay-wares

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 B28B); 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

35/01 . based on oxide ceramics

WARNING
Groups C04B 35/01 - C04B 35/499 are incomplete pending reclassification of documents from groups C04B 35/80, C04B 35/803, and C04B 35/806.
All groups listed in this Warning should be considered in order to perform a complete search.

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 (ZrSiO4)
35/107 . . . . Refractories by fusion casting
35/109 . . . . containing zirconium oxide or zircon (ZrSiO4)
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]
Ceramics

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 ferries
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]
35/2633 . . . [containing barium, strontium or calcium]
35/2641 . . . [Compositions containing one or more ferrites of the group comprising rare earth metals and one or more ferrites of the group comprising alkali metals, alkaline earth metals or lead]

35/265 . . . [Compositions containing one or more ferrites of the group comprising manganese and zinc or one or more ferrites of the group comprising nickel, copper or cobalt]
35/2658 . . . [Other ferrites containing manganese or zinc, e.g. Mn-Zn ferrites]
35/2666 . . . [Other ferrites containing nickel, copper or cobalt]
35/2675 . . . [Other ferrites containing rare earth metals, e.g. rare earth ferrite garnets]
35/2683 . . . [Other ferrites containing alkaline earth metals or lead]
35/2691 . . . [Other ferrites containing alkaline metals]
35/42 . . . based on chromites (C04B 35/472 and C04B 35/105 take precedence)
35/44 . . . based on aluminates
35/43 . . . Magnesium aluminate spinel
35/47 . . . based on phosphates, e.g. hydroxyapatite
35/45 . . . based on copper oxide or solid solutions thereof with other oxides

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]

WARNING
Groups C04B 35/50 and C04B 35/505 are incomplete pending reclassification of documents from groups C04B 35/80, C04B 35/803, and C04B 35/806.

All groups listed in this Warning should be considered in order to perform a complete search.

35/505 . . . based on yttrium oxide
35/51 . . . based on compounds of actinides [non-oxide actinide compounds C04B 35/5158] nuclear fuel materials C2IC 3/62

WARNING
Group C04B 35/51 is incomplete pending reclassification of documents from groups C04B 35/80, C04B 35/803, and C04B 35/806.

All groups listed in this Warning should be considered in order to perform a complete search.

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

WARNING

All groups listed in this Warning should be considered in order to perform a complete search.

35/5152 . . . [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
35/532 . . . 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 oxy carbides (containing free metal binder C22C 29/00)]
35/5603 . . . [with a well-defined oxygen content, e.g. oxy carbides]
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 oxy carb nitrides] 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]
35/58035 . . . [based on zirconium or hafnium carbonitrides]
35/58042 . . . [based on iron group metals nitrides]
35/5805 . . . [based on borides]
35/58057 . . . [based on magnesium boride, e.g. MgB2]
35/58064 . . . [based on refractory borides]
35/58071 . . . [based on titanium borides]
35/58078 . . . [based on zirconium or hafnium borides]
35/58085 . . . [based on silicides]
35/58092 . . . [based on refractory metal silicides]
35/581 . . . based on aluminium nitride
35/583 . . . based on boron nitride
35/5831 . . . [based on cubic boron nitrides or Wurtzitic boron nitrides, including crystal structure transformation of powder]
35/584 . . . 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

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 2235/60 - C04B 2235/668

35/62204 . . . [using waste materials or refuse (clay-wares containing waste materials C04B 33/132)]
35/62209 . . . [using wooden material, remaining in the ceramic products (to obtain porous material by burning out C04B 38/06)]
35/62213 . . . [using rice material, e.g. bran or hulls or husks]
35/62218 . . . [obtaining ceramic films, e.g. bran or hulls or husks]
35/62222 . . . [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)]
35/62227 . . . [obtaining fibres]
35/62231 . . . [based on oxide ceramics]
35/62236 . . . [fibres based on aluminium oxide]
35/6224 . . . [fibres based on silica]
35/62245 . . . [rich in aluminium oxide]
35/6225 . . . [fibres based on zirconium oxide, e.g. zirconates such as PZT]
35/62254 . . . [fibres based on copper oxide]
35/62259 . . . [fibres based on titanium oxide]
35/62263 . . . [fibres based on magnesium oxide]
35/62268 . . . [fibres based on metal phosphorous oxides, e.g. phosphates]
35/62272 . . . [based on non-oxide ceramics (carbon nanotubes C01B 32/15; carbon fibers D01F 9/12)]
35/62277 . . . [fibres based on carbides]
35/62281 . . . [based on silicon carbide (C04B 35/571 takes precedence)]
35/62286 . . . [fibres based on nitrides]
35/6229 . . . [based on boron nitride]
35/62295 . . . [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]
35/62605 . . . [Treating the starting powders individually or as mixtures]
35/6261 . . . [Millling]
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]
Coating the powders (or the macroscopic reinforcing agents)

- Coating fibres
- [with oxide ceramics]
- [with non-oxide ceramics]
- [Silica or silicates]
- [Alumina or aluminates]
- [Rare earth metal oxides]
- [Refractory metal oxides]
- [Titanium oxide]
- [Zirconium or hafnium oxide]
- [Iron group metal oxides]
- [Non-oxide ceramics]
- [Carbides]
- [Silicon carbide]
- [Nitrides]
- [Carbon]
- [Metal foils]
- [Polysaccharides or derivatives thereof]
- Polyethylene oxide [PEO]
- Polydactones, e.g. maleic anhydride copolymers
- Polyvinylchloride [PVC]
- Polyethyleneimine [PEI]
- Polyvinylbutyral [PVB]
- Polyvinylacetals, e.g. Polyvinylalcohols [PVA]; polyvinylacetate
- Polyaspartic acid (PLA)
- Polyamides
- Polyalkenes
- Polyolefins
- Polyurethanes; Polyisocyanates
- Polycarbonates
- Polymides
- Polyesters
- Polyacrylates; Polymethacrylates
- Polyethers, e.g. alkylphenol polyethoxylates
- Polyesters
- Polyalkenes
- Polyethylene oxides
- Polyacrylates; Polymethacrylates
- Polyacrylamides, polyacrylonitriles, polyvinylpyrrolidone [PVP], polyethylene imine [PEI]
- Polyvinylacetals, e.g. Polyvinylalcohols [PVA]; polyvinylacetate
- Polyvinylchloride [PVC]
- Polyethyleneimine [PEI]
- Polyvinylbutyral [PVB]
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- Polyvinylacetals, e.g. Polyvinylalcohols [PVA]; polyvinylacetate
- Polyamides
- Polyesters
- Polyacrylates; Polymethacrylates
- Polyacrylamides, polyacrylonitriles, polyvinylpyrrolidone [PVP], polyethylene imine [PEI]
35/638 . . . Removal thereof
35/64 . . . Burning or sintering processes (C04B 33/32 takes precedence; powder metallurgy B22F)
35/645 . . . Pressure sintering
35/6455 . . . [Hot isostatic pressing]
35/65 . . . Reaction sintering of free metal- or free silicon-containing compositions
(C04B 35/573, C04B 35/591, C04B 35/597, C04B 35/71)
35/651 . . . [Thermite type sintering, e.g. combustion sintering]
35/652 . . . [Directional oxidation or solidification, e.g. Lanxide 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 E27D 1/16)
35/71 . . . Ceramic products containing macroscopic reinforcing agents (C04B 35/66 takes precedence;
infiltration of a porous ceramic matrix with Si in order to form a non-ceramic phase C04B 41/00; reaction infiltration with Si in order to form Si3N4, in order to form Si3N4)

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

WARNING
Group C04B 35/80 is incomplete pending reclassification of documents from groups C04B 35/00 and C04B 35/06.
Group C04B 35/80 is also impacted by reclassification into groups C04B 35/01 - C04B 35/597.
All groups listed in this Warning should be considered in order to perform a complete search.

35/803 . . . [The matrix of the ceramic products consisting of oxides only] (Frozen)

WARNING
Group C04B 35/803 is no longer used for the classification of documents as of May 1, 2020.
The content of this group is being reclassified into groups C04B 35/80, C04B 35/01 - C04B 35/597.
All groups listed in this Warning should be considered in order to perform a complete search.

35/806 . . . [The matrix of the ceramic products consisting of non-oxides only] (Frozen)

WARNING
Group C04B 35/806 is no longer used for classification of documents as of May 1, 2020.
The content of this group is being reclassified into groups C04B 35/80, C04B 35/01 - C04B 35/597.
All groups listed in this Warning should be considered in order to perform a complete search.

35/82 . . . Asbestos; Glass; Fused silica
35/83 . . . Carbon fibres in a carbon matrix

NOTE
The products covered by this group are usually referred to as "carbon-carbon composites".

37/00 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

37/001 . . . [directly with other burned ceramic articles]
37/003 . . . [by means of an interlayer consisting of a combination of materials selected from glass, or ceramic material with metals, metal oxides or metal salts]
37/005 . . . [consisting of glass or ceramic material]
37/006 . . . [consisting of metals or metal salts]
37/008 . . . [by means of an interlayer consisting of an organic adhesive, e.g. phenol resin or pitch]
37/02 . . . with metallic articles
37/021 . . . [in a direct manner, e.g. direct copper bonding (DCB)]
37/023 . . . [characterised by the interlayer used (C04B 37/202 takes precedence)]
37/025 . . . [consisting of glass or ceramic material]
37/026 . . . [consisting of metals or metal salts]
37/028 . . . [by means of an interlayer consisting of an organic adhesive, e.g. phenol resin or pitch]
37/04 . . . with articles made from glass
37/042 . . . [in a direct manner]
37/045 . . . [characterised by the interlayer used (C04B 37/047 takes precedence)]
37/047 . . . [by means of an interlayer consisting of an organic adhesive, e.g. phenol resin or pitch]
Ceramics

38/00 Porous mortars, concrete, artificial stone or ceramic ware; Preparation thereof (treating slag with gases or gas generating material C04B 5/06 ; expanded graphite C04B 35/34)

NOTE

Porous materials based on fibres, i.e. materials where the porosity is due to the spaces between the fibres, are not classified in this maingroup, but in one or more of the other relevant maingroups of this subclass, e.g. in C04B 30/02

38/003 . . . [containing continuous channels, e.g. of the "dead-end" type or obtained by pushing bars in the green ceramic product (B28B takes precedence)]

38/006 . . . [Honeycomb structures (from one or more corrugated sheets by winding or stacking C04B 38/0083)]

38/009 . . . . [characterised by features relating to the cell walls, e.g. wall thickness or distribution of pores in the walls]

38/012 . . . [characterised by the material used for sealing or plugging (some of) the channels of the honeycombs]

38/016 . . . [assembled from subunits]

38/019 . . . . [characterised by the material used for joining separate subunits]

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

38/022 . . . [obtained by a chemical conversion or reaction other than those relating to the setting or hardening of cement-like material or to the formation of a sol or a gel, e.g. by carbonising or pyrolysing preformed cellular materials based on polymers, organo-metallic or organo-silicon precursors]

38/025 . . . [starting from inorganic materials only, e.g. metal foam; Lanxide type products]

38/029 . . . [Porous deposits from the gas phase, e.g. on a temporary support]

38/032 . . . [one of the precursor materials being a monolithic element having approximately the same dimensions as the final article, e.g. a paper sheet which after carbonisation will react with silicon to form a porous silicon carbide porous body]

38/035 . . . [by evaporation induced self-assembly]

38/038 . . . [by superficial sintering or bonding of particulate matter]

38/041 . . . [the particulate matter having preselected particle sizes]

38/045 . . . [by a process involving the formation of a sol or a gel, e.g. sol-gel or precipitation processes]

38/048 . . . [Precipitation processes]

38/051 . . . [characterised by the pore size, pore shape or kind of porosity]

38/054 . . . [the pores being microwized or nanosized]

38/058 . . . [open porosity]

38/061 . . . [closed porosity]

38/064 . . . [Multimodal pore size distribution]

38/067 . . . [characterised by the density of the end product]

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

38/004 . . . [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]

38/02 . . . by adding chemical blowing agents

38/025 . . . [generated by microorganisms]

38/04 . . . [by dissolving-out added substances]

38/045 . . . [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)]

38/06 . . . 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.

38/0605 . . . [by sublimating]

38/061 . . . [by melting out]

38/0615 . . . [the burned-out substance being a monolithic element having approximately the same dimensions as the final article, e.g. a porous polyurethane sheet or a prepreg obtained by bonding together resin particles (C04B 38/0022 takes precedence)]

38/062 . . . . [the burned-out substance being formed in situ, e.g. by polymerisation of a prepolymer composition containing ceramic powder]

38/0625 . . . [involving a foaming step of the burnable material]

38/063 . . . [Preparing or treating the raw materials individually or as batches]

38/0635 . . . [Compounding ingredients (C04B 38/0615 takes precedence)]

38/064 . . . . [Natural expanding materials, e.g. clay]
CERAMICS

38/0645 . . . . [Burnable, meltable, sublimable materials]
38/065 . . . . . . (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 38/0651 in the Combination Set, if the importance of the size of the pores obtained is emphasized.

38/0655 . . . . . . [Porous materials (C04B 38/0625 takes precedence)]
38/066 . . . . . . (characterised by distribution, e.g. for obtaining inhomogeneous distribution of pores)

NOTE
Documents having this group as classification symbol or as part of a Combination Set can also get symbol C04B 38/0607 in the Combination Set, if the importance of the distribution of the pores is emphasized.

38/0665 . . . . . . (Waste material; Refuse other than vegetable refuse)
38/067 . . . . . . [Macromolecular compounds (C04B 38/062 takes precedence; polysaccharides C04B 38/0645)]
38/0675 . . . . . . {Vegetable refuse; Cellulosic materials, e.g. wood chips, cork, peat, paper}
38/068 . . . . . . {Carbonaceous materials, e.g. coal, carbon, graphite, hydrocarbons}
38/0685 . . . . . . {Minerals containing carbon, e.g. oil shale}
38/069 . . . . . . {Other materials, e.g. catalysts (C04B 33/13, C04B 35/00 take precedence)}
38/0695 . . . . {Physical aspects of the porous material obtained}
38/08 . . . by adding porous substances
38/085 . . . . . . (of micro- or nanosize)
38/10 . . . by using foaming agents (C04B 38/02 takes precedence) {or by using mechanical means, e.g. adding preformed foam}
38/103 . . . [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)
40/0003 . . . [making use of electric or wave energy or particle radiation]
40/0007 . . . [Electric, magnetic or electromagnetic fields]
40/001 . . . [Electromagnetic waves]
40/0014 . . . [Microwaves]
40/0017 . . . [Irradiation, i.e. gamma -, X -, UV rays]
40/0021 . . . [Sonic or ultrasonic waves, e.g. to initiate sonochemical reactions]
40/0025 . . . [obtaining colloidal mortar]
40/0028 . . . [Aspects relating to the mixing step of the mortar preparation]
40/0032 . . . [Controlling the process of mixing, e.g. adding ingredients in a quantity depending on a measured or desired value (B28C 7/00 takes precedence)]
40/0035 . . . [Processes characterised by the absence of a mechanical mixing step, e.g. "no-mix" processes]
40/0039 . . . [Premixtures of ingredients]
40/0042 . . . . [Powdery mixtures]
40/0046 . . . . [characterised by their processing, e.g. sequence of mixing the ingredients when preparing the premixtures]
40/005 . . . . [High shear mixing; Obtaining macro-defect free materials]
40/0053 . . . . [Obtaining macro-defect free materials otherwise than by high shear mixing]
40/0057 . . . [Energetic mixing (C04B 40/005 takes precedence)]
40/006 . . . . [involving the elimination of excess water from the mixture]
40/0064 . . . . [Processes of the Magnini or Hatschek type]
40/0067 . . . [making use of vibrations]
40/0071 . . . [making use of a rise in pressure]
40/0075 . . . [making use of a decrease in temperature]
40/0078 . . . . [by freezing]
40/0082 . . . [making use of a rise in temperature, e.g. caused by an exothermic reaction]
40/0085 . . . . [involving melting of at least part of the composition]
40/0089 . . . [making use of vacuum or reduced pressure]
40/0092 . . . [Temporary binders, mortars or concrete, i.e. materials intended to be destroyed or removed after hardening, e.g. by acid dissolution]
40/0096 . . . [Provisions for indicating condition of the compositions or the final products, e.g. degree of homogeneous mixing, degree of wear]
40/02 . . . . 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
40/0204 . . . [making use of electric or wave energy or particle radiation]
40/0209 . . . [Electric, magnetic or electromagnetic fields]
40/0213 . . . [Electromagnetic waves]
40/0218 . . . . [Microwaves]
40/0222 . . . . [Irradiation, i.e. gamma -, X -, UV rays]
40/0227 . . . . [Sonic or ultrasonic waves]
40/0231 . . . [Carbon dioxide hardening]
40/0236 . . . . [Carbon dioxide post-treatment of already hardened material]
40/024 . . . [Steam hardening, e.g. in an autoclave]
40/0245 . . . [including a pre-curing step not involving a steam or autoclave treatment]
40/025 . . . . [Adiabatic curing or hardening]
40/0254 . . . [Hardening in an enclosed space, e.g. in a flexible container]
Ceramics

40/0259 . . . {Hardening promoted by a rise in pressure
(C04B 40/024 takes precedence)}
40/0263 . . . {Hardening promoted by a rise in temperature
(C04B 40/024 takes precedence)}
40/0268 . . . . {Heating up to sintering temperatures
(C04B 40/024 takes precedence)}
40/0272 . . . {Hardening under vacuum or reduced pressure}
40/0277 . . . . {Hardening promoted by using additional water,
e.g. by spraying water on the green concrete
element (steam hardening C04B 40/024)}
40/0281 . . . . {Hardening in an atmosphere of increased
relative humidity}
40/0286 . . . . {Hardening under water}
40/029 . . . . . {using an aqueous solution or dispersion}
40/0295 . . . . . {Inhomogeneous curing or hardening, e.g.
accelerated curing of surface regions of a concrete
article; Influencing the setting or hardening
process to generate physical or mechanical
effects, e.g. to create cracks}
40/04 . Preventing evaporation of the mixing water
(permanent coverings C04B 41/00)
40/06 . Inhibiting the setting, e.g. mortars of the deferred
action type containing water in breakable containers
(: Inhibiting the action of active ingredients)

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.

40/0608 . . . {Dry ready-made mixtures, e.g. mortars at which
only water or a water solution has to be added
before use}
40/0616 . . . . {preformed, e.g. bandages}
40/0625 . . . . {Wet ready-made mixtures, e.g. mortars in water-
or airtight packages, or mortars containing an
accelerator in a breakable emulsion}
40/0633 . . . . {Chemical separation of ingredients, e.g. slowly
soluble activator}
40/0641 . . . . {Mechanical separation of ingredients, e.g.
accelerator in breakable microcapsules}
40/065 . . . . . {Two or more component mortars}
40/0658 . . . . {Retarder inhibited mortars activated by the
addition of accelerators or retarder-neutralising
agents}
40/0666 . . . . . {Chemical plugs based on hydraulic hardening
materials}
40/0675 . . . . . {Mortars activated by rain, percolating or sucked-
up water, Self-healing mortars or concrete}
40/0683 . . . . . {inhibiting by freezing or cooling}
40/0691 . . . . . {Thermally activated mortars, e.g. by melting
ingredients}

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

41/00 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.

41/0009 . . . . . {Demolition agents based on cementitious or like
materials}

NOTE
Products classified in group C04B 41/0009
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)
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.

NOTE
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.

NOTE
Coating or impregnating with a solution, emulsion, dispersion or suspension is allocated in Combination Sets

NOTE
Coating or impregnating with a molten bath as vehicle, e.g. molten borax is allocated in Combination Sets

NOTE
Coating or impregnating with a suspension of a specific material is classified according to the specific material and symbol C04B 41/4529 is allocated in Combination Sets

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

NOTE
Coating or impregnating with a suspension of a specific material is classified according to the specific material and symbols C04B 41/4545, C04B 41/4549 are allocated in Combination Sets

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

NOTE
Coating or impregnating with a suspension of a specific material is classified according to the specific material and symbols C04B 41/4545, C04B 41/4549 are allocated in Combination Sets

NOTE
Coating or impregnating with a product reacting with the substrate, e.g. generating a metal coating by surface reduction of a ceramic substrate is allocated in Combination Sets

NOTE
Coating or impregnating involving the chemical conversion of an already applied layer, e.g. obtaining an oxide layer by oxidising an applied metal layer is allocated in Combination Sets

NOTE
Coating or impregnating with a specific material from the gas phase is classified according to the specific material and symbol C04B 41/4533 is allocated in Combination Sets

NOTE
Coating or impregnating with a specific material from the gas phase is classified according to the specific material and symbol C04B 41/4523 is allocated in Combination Sets

NOTE
Coating or impregnating with a specific material from the gas phase is classified according to the specific material and symbol C04B 41/4549 is allocated in Combination Sets
Ceramics

41/456 . . . . (the conversion only taking place under certain conditions, e.g. avoiding damage of underlying 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

41/4815 . . . . [Melamine-formaldehyde condensation products]
41/4819 . . . . [Urea-formaldehyde condensation products]
41/4823 . . . . [Phenol-formaldehyde condensation products]
41/4826 . . . . [Polysters]
41/483 . . . . [Polyacrylates]
41/4834 . . . . [Polyacrylamides]
41/4838 . . . . [Halogenated polymers]
41/4842 . . . . [Fluorine-containing polymers]
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; Polyisocyanates]
41/4888 . . . . [Polycarbonates]
41/4892 . . . . [Poliamides]
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 RaSix4+n, e.g. alkyltrialkoxyxyilane, dialkyldialkoxyxyiline]
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]
Ceramics

41/4955 . . . . . . . . . . . {Polyorganosilanes, i.e. polymers with a Si-Si-Si- chain}
41/4961 . . . . . . . . . . . {Polyorganosiloxanes, i.e. polymers with a Si-O-Si-O-chain; "silicones"}
41/4966 . . . . . . . . . . . [containing silicon bound to hydroxy groups, i.e. OH-blocked polyorganosiloxanes]
41/4972 . . . . . . . . . . . [Alkali metal or ammonium salts]
41/4977 . . . . . . . . . . . [characterised by the number of silicon atoms]
41/4983 . . . . . . . . . . . {Polycarbosilanes, i.e. polymers with a -Si-C-Si-chain; Polysilazanes, i.e. polymers with a -Si-N-Si-chain; Polysilathiannes, i.e. polymers with a -Si-Si-Si-chain}
41/4988 . . . . . . . . . . . {Organosilicium-organic copolymers, e.g. olefins with terminal silane groups}
41/4994 . . . . . . . . . . . {Organophosphorus 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 intercalation 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. ocratation]
41/502 . . . . . . . . . . . [Water]
41/5022 . . . . . . . . . . . [with vitreous materials (composition of vitreous glazes and enamels C03C; ceramic pigments C09C 1/0099)]

**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 41/5022 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

41/5027 . . . . . . . . . . . [Oxide ceramics in general; Specific oxide ceramics not covered by C04B 41/5029 - C04B 41/5051]
41/5028 . . . . . . . . . . . [Magnesias]
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 oxy nitrides, 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 41/5056)]
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 magnesium oxide cements]
41/5085 . . . . . . . . . . . [Calcium sulfate cements]
41/5087 . . . . . . . . . . . [Anhydrite]
41/5088 . . . . . . . . . . . [Cementitious compositions of the silicate-type]
41/5089 . . . . . . . . . . . [Silica sols, alkyl, ammonium or alkali metal silicate cements]
41/509 . . . . . . . . . . . [Magnesium cements, e.g. Sorel cement]
Ceramics

2. Groups C04B 41/522

- are classified as single coating or impregnation in the concentration of the constituents, is classified as single coating or impregnation and symbol C04B 41/522 is allocated in Combination Sets

- with elements other than metals or carbon

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. oxyxidides 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. . . . [Pd or Pt]
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. . . . [Tin]
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]

41/526. . . . [Multiple coating or impregnation with materials having the same composition but different characteristics]
41/528. . . . [Applying layers containing the same composition or with compositions only differing in the concentration of the constituents, is classified as single coating or impregnation and symbol C04B 41/522 is allocated in Combination Sets]
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 21/506)]
41/5346. . . . [Dry etching]
41/5353. . . . [Wet etching, e.g. with etchants dissolved in organic solvents]
41/5361. . . . [Etching with molten metal]
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 electrochemical methods (electrochemical desalination C04B 41/5376)]
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. ocration
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
Ceramics

Function or property of ingredients for mortars, concrete or artificial stone

1. Living organisms, e.g. microorganisms, or enzymes
2. Seeds
3. Unintentionally added compounds, such as impurities in raw materials, e.g. alkali sulfates in construction grade cement
4. Compounds chosen for the nature of their cations
5. Organic ammonium compounds
6. Alkali metal or inorganic ammonium compounds
7. Alkaline earth metal or Mg-compounds
8. Ba
9. Mg
10. Iron group metal compounds
11. Fe
12. Noble metal or copper compounds
13. Cu
14. Refractory metal compounds
15. Cr
16. Ti
17. Compounds of elements having a valency of 2
18. Compounds of elements having a valency of 3
19. Compounds of elements having a valency of 4
20. Compounds of elements having a valency of 5
21. Compounds of elements having a valency of 6
22. Compounds of the transition metals
23. Compounds of the composition
24. According to ASTM
25. According to DIN
26. Non-polymeric ingredients chosen for their physico-chemical characteristics
27. Amorphous materials
28. Compounds chosen for their specific Moh's hardness
29. Compounds chosen for their abrasion resistance, e.g. determined according to the L.A. test
30. Polymers chosen for their physico-chemical characteristics
31. added as monomers or as oligomers
32. as a mixture of nonomers and prepolymers or oligomers

Polymers chosen for their physico-chemical characteristics

1. Polymeric ingredients chosen for their physico-chemical characteristics
2. Polymers unstable in the presence of hydraulic binders, e.g. polymers flocculating in concrete mixtures
3. Polymers characterised by their glass transition temperature (Tg)
4. Polymers chosen for their abrasion resistance, hardness
5. Compounds chosen for their specific Moh's hardness
6. Compounds chosen for their abrasion resistance, e.g. determined according to the L.A. test
7. Polymers chosen for their physico-chemical characteristics
8. added as monomers or as oligomers
9. [as oligomers]
10. [Water-swellable polymers]
11. [Alkali-swellable polymers]
12. [Water-absorbing polymers, hydrophilic polymers]
13. [Hydrophobic polymers]
14. [Water-soluble polymers]
15. [Water dispersible polymers]
16. [Water-insoluble polymers]
17. [Thermohardening polymers]
18. [added as redispersable powders]
19. [Core-shell polymers]
20. [Graft (co-)polymers]
21. [Comb polymers]
22. [Block (co-)polymers]
23. [Cross-linked polymers]
24. [obtained by an unusual polymerisation process, e.g. by changing the molar ratio of the different monomers during the polymerisation process (C04B 2103/0058 - C04B 2103/0061 take precedence)]
25. [Polymers unstable in the presence of hydraulic binders, e.g. polymers flocculating in concrete mixtures]
26. Polymers characterised by their glass transition temperature (Tg)
27. Polymers chosen for their abrasion resistance, hardness
28. Compounds chosen for their specific Moh's hardness
29. Compounds chosen for their abrasion resistance, e.g. determined according to the L.A. test
30. Polymers chosen for their physico-chemical characteristics
31. added as monomers or as oligomers
32. as a mixture of nonomers and prepolymers or oligomers

Function or property of ingredients for mortars, concrete or artificial stone

1. Living organisms, e.g. microorganisms, or enzymes
2. Seeds
3. Unintentionally added compounds, such as impurities in raw materials, e.g. alkali sulfates in construction grade cement
4. Compounds chosen for the nature of their cations
5. Organic ammonium compounds
6. Alkali metal or inorganic ammonium compounds
7. Alkaline earth metal or Mg-compounds
8. Ba
9. Mg
10. Iron group metal compounds
11. Fe
12. Noble metal or copper compounds
13. Cu
14. Refractory metal compounds
15. Cr
16. Ti
17. Compounds of elements having a valency of 2
18. Compounds of elements having a valency of 3
19. Compounds of elements having a valency of 4
20. Compounds of elements having a valency of 5
21. Compounds of elements having a valency of 6
22. Compounds of the transition metals
23. Compounds of the composition
24. According to ASTM
25. According to DIN
26. Non-polymeric ingredients chosen for their physico-chemical characteristics
27. Amorphous materials
28. Compounds chosen for their specific Moh's hardness
29. Compounds chosen for their abrasion resistance, e.g. determined according to the L.A. test
30. Polymers chosen for their physico-chemical characteristics
31. added as monomers or as oligomers
32. as a mixture of nonomers and prepolymers or oligomers

Polymers chosen for their physico-chemical characteristics

1. Polymeric ingredients chosen for their physico-chemical characteristics
2. Polymers unstable in the presence of hydraulic binders, e.g. polymers flocculating in concrete mixtures
3. Polymers characterised by their glass transition temperature (Tg)
4. Polymers chosen for their abrasion resistance, hardness
5. Compounds chosen for their specific Moh's hardness
6. Compounds chosen for their abrasion resistance, e.g. determined according to the L.A. test
7. Polymers chosen for their physico-chemical characteristics
8. added as monomers or as oligomers
9. as a mixture of nonomers and prepolymers or oligomers

Polymers chosen for their physico-chemical characteristics

1. Polymeric ingredients chosen for their physico-chemical characteristics
2. Polymers unstable in the presence of hydraulic binders, e.g. polymers flocculating in concrete mixtures
3. Polymers characterised by their glass transition temperature (Tg)
4. Polymers chosen for their abrasion resistance, hardness
5. Compounds chosen for their specific Moh's hardness
6. Compounds chosen for their abrasion resistance, e.g. determined according to the L.A. test
7. Polymers chosen for their physico-chemical characteristics
8. added as monomers or as oligomers
9. as a mixture of nonomers and prepolymers or oligomers

Polymers chosen for their physico-chemical characteristics

1. Polymeric ingredients chosen for their physico-chemical characteristics
2. Polymers unstable in the presence of hydraulic binders, e.g. polymers flocculating in concrete mixtures
3. Polymers characterised by their glass transition temperature (Tg)
4. Polymers chosen for their abrasion resistance, hardness
5. Compounds chosen for their specific Moh's hardness
6. Compounds chosen for their abrasion resistance, e.g. determined according to the L.A. test
7. Polymers chosen for their physico-chemical characteristics
8. added as monomers or as oligomers
9. as a mixture of nonomers and prepolymers or oligomers
Agents for protection against chemical, physical or biological attack

**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.

**NOTE**

Code C04B 2111/00043 is only used in combination with groups C04B 26/00 - C04B 26/32.
2111/00215  . . . [Mortar or concrete mixtures defined by their oxide composition]
2111/00224  . . . [Green materials, e.g. porous green ceramic preforms]
2111/00232  . . . [Temporary foams]
2111/00241  . . . [Physical properties of the materials not provided for elsewhere in C04B 2111/00]
2111/0025  . . . [Compositions or ingredients of the compositions characterised by the crystal structure]
2111/00258  . . . [Electromagnetic wave absorbing or shielding materials]
2111/00267  . . . [Materials permeable to vapours or gases]
2111/00275  . . . [Materials impermeable to vapours or gases]
2111/00284  . . . [Materials permeable to liquids]
2111/00293  . . . [Materials impermeable to liquids]
2111/00301  . . . [Non-porous materials, e.g. macro-defect free [MDF] products]
2111/0031  . . . [Heavy materials, e.g. concrete used as ballast material]
2111/00318  . . . [Materials characterised by relatively small dimensions, e.g. small thickness]
2111/00327  . . . [for obtaining microstructures]
2111/00336  . . . [Materials with a smooth surface, e.g. obtained by using glass-surfaced moulds]
2111/00344  . . . [Materials with friction-reduced moving parts, e.g. ceramics lubricated by impregnation with carbon]
2111/00353  . . . [Sliding parts]
2111/00362  . . . [Friction materials, e.g. used as brake linings, anti-skid materials]
2111/0037  . . . [Materials containing oriented fillers or elements]
2111/00379  . . . [the oriented elements being fibres]
2111/00387  . . . [Anisotropic materials]
2111/00396  . . . [only the surface part being anisotropic]
2111/00405  . . . [Materials with a gradually increasing or decreasing concentration of ingredients or property from one layer to another]
2111/00413  . . . [Materials having an inhomogeneous concentration of ingredients or irregular properties in different layers]
2111/00422  . . . [Magnetic properties]
2111/00431  . . . [Refractory materials]
2111/00439  . . . [Physico-chemical properties of the materials not provided for elsewhere in C04B 2111/00]
2111/00448  . . . [Low heat cements]
2111/00456  . . . [Odorless cements]
2111/00465  . . . [Heat conducting materials]
2111/00474  . . . [Uses not provided for elsewhere in C04B 2111/00]
2111/00482  . . . [Coating or impregnation materials]
2111/00491  . . . [Primers]
2111/005  . . . [for frescos]
2111/00508  . . . [Cement paints]
2111/00517  . . . [for masonry]
2111/00525  . . . [for metallic surfaces]
2111/00534  . . . [for plastic surfaces, e.g. polyurethane foams]
2111/00543  . . . [for wet surfaces]
2111/00551  . . . [Refractory coatings, e.g. for tamping]
2111/0056  . . . [for ship decks]
2111/00568  . . . [Multiple coating with same or similar material]
2111/00577  . . . [applied by spraying (mixtures shapable by spraying C04B 2111/00155)]
2111/00586  . . . [Roofing materials]
2111/00594  . . . [Concrete roof tiles]
2111/00603  . . . [Ceiling materials]
2111/00612  . . . [as one or more layers of a layered structure]
2111/0062  . . . [Gypsum-paper board like materials]
2111/00629  . . . [the covering sheets being made of material other than paper]
2111/00637  . . . [as glue or binder for uniting building or structural materials]
2111/00646  . . . [Masonry mortars]
2111/00655  . . . [Profiles]
2111/00663  . . . [as filling material for cavities or the like]
2111/00672  . . . [Pointing or jointing materials]
2111/00681  . . . [of the drying type]
2111/00689  . . . [of the setting type]
2111/00698  . . . [for cavity walls]
2111/00706  . . . [around pipelines or the like]
2111/00715  . . . [for fixing bolts or the like]
2111/00724  . . . [in mining operations, e.g. for backfilling; in making tunnels or galleries]
2111/00732  . . . [for soil stabilisation]
2111/00741  . . . [Preventing erosion]
2111/0075  . . . [for road construction]
2111/00758  . . . [for agri-, sylvi- or piscicultural or cattle-breeding applications]
2111/00767  . . . [for waste stabilisation purposes]
2111/00775  . . . [the composition being used as waste barriers or the like, e.g. compositions used for waste disposal purposes only, but not containing the waste itself]
2111/00784  . . . [for disposal only]
2111/00793  . . . [as filters or diaphragms]
2111/00801  . . . [Membranes; Diaphragms]
2111/0081  . . . [as catalysts or catalyst carriers]
2111/00818  . . . [Enzyme carriers]
2111/00827  . . . [Photocatalysts; (materials containing photocatalysts to avoid staining by air pollutants C04B 2111/2061)]
2111/00836  . . . [for medical or dental applications]
2111/00844  . . . [for electronic applications]
2111/00853  . . . [in electrochemical cells or batteries, e.g. fuel cells]
2111/00862  . . . [for nuclear applications, e.g. ray-absorbing concrete]
2111/0087  . . . [for metallurgical applications]
2111/00879  . . . [Non-ferrous metallurgy]
2111/00887  . . . [Ferrous metallurgy]
2111/00896  . . . [as prepregs]
2111/00905  . . . [as preforms]
2111/00913  . . . [as ceramic preforms for the fabrication of metal matrix comp, e.g. cermets]
2111/00922  . . . [Preforms as such]
2111/00931  . . . [Coated or infiltrated preforms, e.g. with molten metal]
2111/00939  . . . [for the fabrication of moulds or cores]
2111/00948  . . . [for the fabrication of containers]
2111/00956  . . . [for making sculptures or artistic casts]
2111/00965  . . . [for household applications, e.g. use of materials as cooking ware]
2111/00974  . . . [for pyrotechnic applications, e.g. blasting]
2111/00982  . . . [as construction elements for space vehicles or aeroplanes]
2111/00991  . . . [for testing]
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2111/10</td>
<td>Compositions or ingredients thereof characterised by the absence or the very low content of a specific material</td>
</tr>
<tr>
<td>2111/1006</td>
<td>Absence of well-defined organic compounds</td>
</tr>
<tr>
<td>2111/1012</td>
<td>Organic solvents</td>
</tr>
<tr>
<td>2111/1025</td>
<td>Alkali-free or very low alkali-content materials</td>
</tr>
<tr>
<td>2111/1031</td>
<td>Lime-free or very low lime-content materials</td>
</tr>
<tr>
<td>2111/1037</td>
<td>Cement-free compositions, e.g. hydraulically hardening mixtures based on waste materials, not containing cement as such</td>
</tr>
<tr>
<td>2111/1043</td>
<td>Calciumaluminate-free refractories</td>
</tr>
<tr>
<td>2111/105</td>
<td>Alumina-free or very low alumina-content materials</td>
</tr>
<tr>
<td>2111/1056</td>
<td>Silica-free or very low silica-content materials</td>
</tr>
<tr>
<td>2111/1062</td>
<td>Halogen-free or very low halogen-content materials</td>
</tr>
<tr>
<td>2111/1068</td>
<td>Halogens other than chlorine</td>
</tr>
<tr>
<td>2111/1075</td>
<td>Chromium-free or very low chromium-content materials</td>
</tr>
<tr>
<td>2111/1081</td>
<td>Chromium VI, e.g. for avoiding chromium eczema (materials containing special additives for affording skin protection C04B 2111/0025)</td>
</tr>
<tr>
<td>2111/1087</td>
<td>Carbon-free or very low carbon content fly ashes; Fly ashes treated to reduce their carbon content or the effect thereof</td>
</tr>
<tr>
<td>2111/1093</td>
<td>Reducing the effect of the carbon content, without removing the carbon</td>
</tr>
<tr>
<td>2111/12</td>
<td>Absence of mineral fibres, e.g. asbestos</td>
</tr>
<tr>
<td>2111/125</td>
<td>Mineral fibres other than asbestos</td>
</tr>
<tr>
<td>2111/20</td>
<td>Resistance against chemical, physical or biological attack</td>
</tr>
<tr>
<td>2111/2007</td>
<td>Avoiding unauthorised or unwanted use or treatment</td>
</tr>
<tr>
<td>2111/2015</td>
<td>Sulfate resistance</td>
</tr>
<tr>
<td>2111/2023</td>
<td>Resistance against alkali-aggregate reaction</td>
</tr>
<tr>
<td>2111/203</td>
<td>Oil-proof or grease-repellant materials</td>
</tr>
<tr>
<td>2111/2038</td>
<td>Resistance against physical degradation</td>
</tr>
<tr>
<td>2111/2046</td>
<td>Shock-absorbing materials</td>
</tr>
<tr>
<td>2111/2053</td>
<td>Earthquake- or hurricane-resistant materials</td>
</tr>
<tr>
<td>2111/2061</td>
<td>Materials containing photocatalysts, e.g. TiO₂, for avoiding staining by air pollutants or the like</td>
</tr>
<tr>
<td>2111/2069</td>
<td>Self cleaning materials, e.g. using lotus effect (using photocatalysts C04B 2111/2061)</td>
</tr>
<tr>
<td>2111/2076</td>
<td>Discouraging resistant materials (self cleaning materials C04B 2111/2069)</td>
</tr>
<tr>
<td>2111/2084</td>
<td>Thermal shock resistance</td>
</tr>
<tr>
<td>2111/2092</td>
<td>Resistance against biological degradation</td>
</tr>
<tr>
<td>2111/21</td>
<td>Efflorescence resistance</td>
</tr>
<tr>
<td>2111/22</td>
<td>Carbonation resistance</td>
</tr>
<tr>
<td>2111/23</td>
<td>Acid resistance, e.g. against acid air or rain</td>
</tr>
<tr>
<td>2111/24</td>
<td>Sea water resistance</td>
</tr>
<tr>
<td>2111/25</td>
<td>Graffiti resistance; Graffiti removing</td>
</tr>
<tr>
<td>2111/26</td>
<td>Corrosion of reinforcement resistance</td>
</tr>
<tr>
<td>2111/265</td>
<td>Cathodic protection of reinforced concrete structures</td>
</tr>
<tr>
<td>2111/27</td>
<td>Water resistance, e.g. waterproof or water-repellent materials</td>
</tr>
<tr>
<td>2111/275</td>
<td>Making materials water insoluble</td>
</tr>
<tr>
<td>2111/28</td>
<td>Fire resistance, i.e. materials resistant to accidental fires or high temperatures</td>
</tr>
<tr>
<td>2111/285</td>
<td>Intumescent materials</td>
</tr>
<tr>
<td>2111/29</td>
<td>Frost-thaw resistance</td>
</tr>
<tr>
<td>2111/30</td>
<td>Nailable or sawable materials</td>
</tr>
<tr>
<td>2111/32</td>
<td>Expansion-inhibited materials</td>
</tr>
<tr>
<td>2111/325</td>
<td>(the expansion being inhibited in one direction only)</td>
</tr>
<tr>
<td>2111/34</td>
<td>Non-shrinking or non-cracking materials</td>
</tr>
<tr>
<td>2111/343</td>
<td>Crack resistant materials</td>
</tr>
<tr>
<td>2111/346</td>
<td>Materials exhibiting reduced plastic shrinkage cracking</td>
</tr>
<tr>
<td>2111/40</td>
<td>Porous or lightweight materials</td>
</tr>
<tr>
<td>2111/42</td>
<td>Floating materials</td>
</tr>
<tr>
<td>2111/50</td>
<td>Flexible or elastic materials</td>
</tr>
</tbody>
</table>

**NOTE:**
- “flexibility” means ability to bend without breaking;
- “elasticity” means property to resist and recover from deformation produced by a force.

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

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

**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.

2235/3201 . . . . . . 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

CPC - 2020.05
Titanium oxides or titanates, e.g. rutile or anatase
Titatanes, not containing zirconia
Alkaline earth titanates
Substoichiometric titanium oxides, e.g. $\text{Ti}_2\text{O}_3$
Vanadium oxides, vanadates or oxide forming salts thereof, e.g. magnesium vanadate
Chromium oxides, chromates, or oxide-forming salts thereof
Chromates or chromites, e.g. aluminum chromate, lanthanum strontium chromite
Zirconium oxides, zirconates, hafnium oxides, hafnates, or oxide-forming salts thereof
Stabilised zirconias, e.g. YSZ or cerium stabilised zirconia
Zirconates or hafnates, e.g. zircon containing also titanium oxide or titanates, e.g. lead zirconate titanate (PZT)
Niobium oxides, niobates, tantalum oxides, tantalates, or oxide-forming salts thereof
Substoichiometric niobium or tantalum oxides, e.g. NbO
Niobates or tantalates, e.g. silver niobate
Molybdenum oxides, molybdates or oxide forming salts thereof, e.g. cadmium molybdate
Tungsten oxides, tungstates, or oxide-forming salts thereof
Tungstates, e.g. scheelite
Manganese oxides, manganeseates, rhenium oxides or oxide-forming salts thereof, e.g. MnO
Mn$_2$O$_4$
Mn$_2$O$_3$
MnO$_2$
Manganese, manganeseates, rhenates or rhenates, e.g. lithium manganese, barium manganese, rhenium oxide
Iron group oxides, their mixed metal oxides, or oxide-forming salts thereof
Iron oxides or oxide forming salts thereof, e.g. hematite, magnetite
Ferrites
Cobalt oxides, cobaltates or cobaltites or oxide forming salts thereof, e.g. bismuth cobaltate, zinc cobaltite
Co$_3$O$_4$
Nickel oxides,nickalates,or oxide-forming salts thereof
Copper oxides, cuprates or oxide-forming salts thereof, e.g. CuO or Cu$_2$O
Cuprates
Zinc oxides, zincates, cadmium oxides, cadmiates, mercury oxides, mercurates or oxide forming salts thereof
Gallium oxides, gallates, indium oxides, indates, thallium oxides, thallates or oxide forming salts thereof, e.g. zinc gallate

Germanium oxides, germanates or oxide forming salts thereof, e.g. copper germanate
Noble metal oxides
Silver oxides
Tin oxides, stannates or oxide forming salts thereof, e.g. indium tin oxide [ITO]
Antimony oxides, antimonates, antimoninites or oxide forming salts thereof, indium antimonate
Lead oxides, plumbates or oxide forming salts thereof, e.g. silver plumbate
Bismuth oxides, bismuthates or oxide forming salts thereof, e.g. zinc bismuthate
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
Silicates other than clay, e.g. water glass
Alkaline earth metal silicates, e.g. barium silicate
Magnesium silicates, e.g. forsterite
Calcium silicates, e.g. wollastonite
Alumino-silicates other than clay, e.g. mullite
Alkaline earth metal aluminosilicates other than clay, e.g. spodumene, alkali feldspars such as albite or orthoclase, micas such as muscovite, zeolites such as natrolite
Alkaline earth metal aluminosilicates other than clay, e.g. corderite, beryl, micas such as margarite, plagioclase feldspars such as anorthite, zeolites such as chabazite
Clays, e.g. bentonites, smectites such as montmorillonite, vermiculites or kaolines, e.g. illite, talc or sepiolite
Glass starting materials for making ceramics, e.g. silica glass
Borosilicate glass
Non-oxide ceramic constituents or additives
Magnesium borides
Refractory metal borides
Carbides
Boron carbides
Silicon carbides
Alpha silicon carbide
Beta silicon carbide
Refractory metal carbides
Titanium carbides
Tungsten carbides
Nitrides, e.g. oxyxynitrides, carbonitrides, oxycarbonitrines, lithium nitride, magnesium nitride
Carbonitrides, e.g. titanium carbonitride, zirconium carbonitride

**NOTE**

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

Boron nitrides

Aluminium nitrides

Silicon nitrides, e.g. silicon carbide, silicon oxynitride

Alpha silicon nitrides

Refractory metal nitrides, e.g. vanadium nitride, tungsten nitride

Silicides, e.g. molybdenum disilicide, iron silicide

Non-oxides with a defined oxygen content, e.g. SiOC, TiON

Metallic constituents or additives not added as binding phase

Alkaline earth metals

Aluminium

Refractory metals

Iron group metals

Copper

Noble metals

Non metallic elements added as constituents or additives, e.g. sulfur, phosphor, selenium or tellurium

Boron

Carbon

Carbon black

Graphite

Diamond

Silicon

Metal salt constituents or additives chosen for the nature of the anions, e.g. hydrides or acetylacetone

Alkoxides, e.g. methoxide, tert-butoxide

Carbonates

Nitrates or nitrates

Halide containing anions, e.g. bromide, iodate, chlorite

Fluoride containing anions, e.g. fluosilicate

Sulfides, tellurides or selenides

Phosphates or phosphites (calcium phosphates C04B 2235/3212), e.g. orthophosphate, hypophosphate

Sulphates or sulphites

Organic acids, e.g. EDTA, citrate, acetate, oxalate

Gases other than oxygen used as reactant, e.g. nitrogen used to make a nitride phase

Ammonia

Organic compounds becoming part of a ceramic after heat treatment, e.g. carbonising phenol resins

Si-containing organic compounds, e.g. silicone resins, (poly)silanes, (poly)siloxanes or (poly)silazanes

Boron containing organic compounds, e.g. borazine, borane or boranyl

Constituents or additives of the starting mixture chosen for their shape or used because of their shape or their physical appearance

Constituents or additives characterised by their shapes

Monocrystalline powders

Fibers

Organic

Inorganic

Oxide

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

having a specific pre-form

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

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
C04B

2235/6026 . . . Computer aided shaping, e.g. rapid prototyping
2235/6027 . . . Slip casting
2235/6028 . . . Shaping around a core which is removed later
2235/604 . . . Pressing at temperatures other than sintering temperatures
2235/605 . . . Making or treating the green body or pre-form in a magnetic field
2235/606 . . . Drying
2235/608 . . . Green bodies or pre-forms with well-defined density
2235/61 . . . Mechanical properties, e.g. fracture toughness, hardness, Young's modulus or strength
2235/612 . . . Machining
2235/614 . . . Gas infiltration of green bodies or pre-forms
2235/616 . . . Liquid infiltration of green bodies or pre-forms
2235/65 . . . Aspects relating to heat treatments of ceramic bodies such as green ceramics or pre-sintered ceramics, e.g. burning, sintering or melting processes
2235/652 . . . Reduction treatment (C04B 2235/664 takes precedence)
2235/656 . . . characterised by specific heating conditions during heat treatment
2235/6562 . . . Heating rate
2235/6565 . . . Cooling rate
2235/6567 . . . Treatment time
2235/658 . . . Atmosphere during thermal treatment
2235/6581 . . . Total pressure below 1 atmosphere, e.g. vacuum
2235/6582 . . . Hydrogen containing atmosphere
2235/6583 . . . Oxygen containing atmosphere, e.g. with changing oxygen pressures
2235/6584 . . . at an oxygen percentage below that of air
2235/6585 . . . at an oxygen percentage above that of air
2235/6586 . . . Processes characterised by the flow of gas
2235/6587 . . . Influencing the atmosphere by vaporising
2235/6588 . . . Water vapor containing atmospheres
2235/66 . . . Specific sintering techniques, e.g. centrifugal sintering
2235/661 . . . Multi-step sintering
2235/662 . . . Annealing after sintering
2235/663 . . . Oxidative annealing
2235/664 . . . Reductive annealing
2235/665 . . . Local sintering, e.g. laser sintering
2235/666 . . . Applying a current during sintering, e.g. plasma sintering [SPS], electrical resistance heating or pulse electric current sintering [PECS]
2235/667 . . . Sintering using wave energy, e.g. microwave sintering
2235/668 . . . Pressureless sintering
2235/670 . . . Aspects relating to sintered or melt-casted ceramic products
2235/72 . . . Products characterised by the absence or the low content of specific components, e.g. alkali metal free alumina ceramics
2235/721 . . . Carbon content
2235/722 . . . Nitrogen content
2235/723 . . . Oxygen content
2235/724 . . . Halogenide content
2235/725 . . . Metal content
2235/726 . . . Sulfur content
2235/727 . . . Phosphorus or phosphorus compound content
2235/728 . . . Silicon content
2235/74 . . . Physical characteristics
2235/75 . . . Products with a concentration gradient
2235/76 . . . 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.

2235/761 . . . Unit-cell parameters, e.g. lattice constants
2235/762 . . . Cubic symmetry, e.g. beta-SiC
2235/765 . . . Garnet structure A,B2(CO3)3
2235/766 . . . Tetragonal symmetry
2235/767 . . . Trigonal symmetry, e.g. alpha-Si3N4 or alpha-Sialon
2235/768 . . . Hexagonal symmetry, e.g. beta-Si3N4, beta-Sialon, alpha-SiC or hexa-ferrites
2235/77 . . . Perovskite structure ABO3
2235/775 . . . Products showing a density-gradient
2235/78 . . . Grain sizes and shapes, product microstructures, e.g. acicular grains, equiaxed grains, platelet-structures
2235/781 . . . Nanograined materials, i.e. having grain sizes below 100 nm
2235/782 . . . Grain size distributions
2235/783 . . . Bimodal, multi-modal or multi-fractional
2235/784 . . . Monomodal
2235/785 . . . Submicron sized grains, i.e. from 0,1 to 1 micron
2235/786 . . . Micrometer sized grains, i.e. from 1 to 100 micron
2235/787 . . . Oriented grains
2235/788 . . . Aspect ratio of the grains
2235/79 . . . Non-stoichiometric products, e.g. perovskites (ABO3) with an A/B-ratio other than 1
2235/80 . . . 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

2235/81 . . . Materials characterised by the absence of phases other than the main phase, i.e. single phase materials
2235/83 . . . Ferrites containing Fe2+
2235/85 . . . Intergranular or grain boundary phases
2235/87 . . . Grain boundary phases intentionally being absent
2235/94 . . . Products characterised by their shape
2235/945 . . . Products containing grooves, cuts, recesses or protusions
2235/95 . . . Products characterised by their size, e.g. microceramics
Aspects relating to ceramic laminates or to joining of ceramic articles with other articles by heating

- 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 H01L, 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

### 2237/00 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

- Ceramic
- Oxidic
- Silica or silicates
- Alumina or aluminates
- Refractory metal oxides
- Titania or titanates
- Zirconia, hafnia, zirconates or hafnates
- Non-oxidic
- Boron nitride
- Carbon
- Silicon carbide
- Aluminium nitride
- Silicon nitride
- Copper
- Noble metals, e.g. palladium, platina or silver
- 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
whereby the interlayer is continuous, but heterogeneous on macro-scale, e.g. one part of the interlayer being a joining material, another part being an electrode material.

whereby the interlayer is continuous but porous, e.g. containing hollow or porous particles, macro- or micropores or cracks.

Forming at the joining interface or in the joining layer specific reaction phases or zones, e.g. diffusion of reactive species from the interlayer to the substrate or from a substrate to the joining interface, carbide forming at the joining interface.

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.

Forming laminates or joined articles comprising holes, channels or other types of openings.

Forming laminates or joined articles comprising grooves or cuts.

Forming laminates or joined articles showing high dimensional accuracy, e.g. indicated by the warpage.

Forming laminates or joining articles wherein at least one substrate contains at least two different parts of macro-size, e.g. one ceramic substrate layer containing an embedded conductor or electrode.

Forming laminates or joined articles comprising layers of a specific, unusual thickness.

Forming laminates or joined articles comprising of one or more of the constraining layers.

Forming laminates or joined articles comprising of one or more of the ceramic layers or articles.

Forming laminates or joined articles comprising of one or more of the metallic layers or articles.

Forming laminates or joined articles comprising of one or more of the interlayers.

Forming laminates or joined articles comprising at least two interlayers directly next to each other.

Forming laminates or joined articles comprising at least two different interlayers separated by a substrate.

Forming laminates or joined articles comprising at least one member in the form other than a sheet or disc, e.g. two tubes or a tube and a sheet or disc.

Forming laminates or joined articles comprising at least one member being a tube.

Side-way connecting, e.g. connecting two plates through their sides.

Joining the largest surface of one substrate with a smaller surface of the other substrate, e.g. butt joining or forming a T-joint.

Two substrates not completely covering each other, e.g. two plates in a staggered position.

Joining of a first substrate with a second substrate at least partially inside the first substrate, where the bonding area is at the inside of the first substrate, e.g. one tube inside another tube.

Joining of two substrates at their largest surfaces, one surface being complete joined and covered, the other surface not, e.g. a small plate joined at it's largest surface on top of a larger plate.

Joining of two substrates, where a substantial part of the joining material is present outside of the joint, leading to an outside joining of the joint.

Organisational aspects of production methods, equipment or plants.

Business methods aspects

Integrated combined plants or devices, e.g. combined foundry and concrete plant.