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:

C04B 5/02	covered by	B01J 2/00, C21B 3/06
C04B 28/20, C04B 28/22	covered by	C04B 28/18, C04B 28/182, C04B 28/184, C04B 28/186, C04B 28/188
C04B 35/035	covered by	C04B 35/26, C04B 35/2608, C04B 35/2616, C04B 35/2625, C04B 35/2633, C04B 35/2641, C04B 35/265, C04B 35/2658, C04B 35/2666, C04B 35/2675, C04B 35/2683, C04B 35/2691
C04B 35/28	covered by	C04B 35/26
C04B 35/30	covered by	C04B 35/26
C04B 35/32	covered by	C04B 35/26
C04B 35/34	covered by	C04B 35/26
C04B 35/36	covered by	C04B 35/26
C04B 35/38	covered by	C04B 35/26
C04B 35/40	covered by	C04B 35/2608, C04B 35/2641, C04B 35/2675
C04B 35/567, C04B 35/569, C04B 35/576, C04B 35/577	covered by	C04B 35/565, C04B 35/571, C04B 35/5755
C04B 35/582	covered by	C04B 35/581
C04B 35/5833, C04B 35/5835	covered by	C04B 35/583
C04B 35/586, C04B 35/594, C04B 35/596	covered by	C04B 35/584, C04B 35/589, C04B 35/591, C04B 35/593, C04B 35/5935
C04B 35/599	covered by	C04B 35/597
C04B 35/81	covered by	C04B 35/78
C04B 35/84	covered by	C04B 35/628, C04B 35/78

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 11/022)}
2/045 . . . {After-treatment of slaked lime}
2/06 . . . with addition of substances, e.g. hydrophobic agents {; Slaking in the presence of other compounds}
2/063 . . . . {Slaking of impure quick lime, e.g. contained in fly ash}
2/066 . . . . {Making use of the hydration reaction, e.g. the reaction heat for dehydrating gypsum; Chemical drying by using unslaked lime}
2/08 . . . Devices therefor
2/10 . Preheating, burning calcining or cooling (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 {**(other cast stone C04B 32/005; mechanical aspects B28B 1/54)**}**
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 pozzuolanas; Natural pozzuolana cements; {Artificial pozzuolanas or artificial pozzuolana cements other than those obtained from waste or combustion residues, e.g. burned clay; Treating inorganic materials to improve their pozzuolanic characteristics (cements containing slag C04B 7/14)}
7/13 . . Mixtures thereof with inorganic cementitious materials, e.g. Portland cements
7/14 . Cements containing slag (slags from waste incineration C04B 7/28)
7/147 . . Metallurgical slag
7/153 . . . Mixtures thereof with other inorganic cementitious materials or other activators
7/1535 . . . . {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, Kühl 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 flue dust {, i.e. fly ash (C04B 7/243 takes precedence)}
7/28 . . from combustion residues, {e.g. ashes or slags from waste incineration}({C04B 7/243} , C04B 7/26 take precedence)
7/30 . . from oil shale; from oil shale residues {; from lignite processing, e.g. using certain lignite fractions}
7/32 . Aluminous cements
7/323 . . {Calcium aluminosulfate cements, e.g. cements hydrating into ettringite}
7/326 . . {Calcium 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 . . {Alinite cements, e.g. "Nudelman"-type cements, bromo-alinite cements, fluoro-alinite cements}
7/36 . Manufacture of hydraulic cements in general
7/361 . . {Condition or time responsive control in hydraulic cement manufacturing processes (controlling or regulating in general G05; F27B 7/42 takes precedence)}
7/362 . . . {for raw materials handling, e.g. during the grinding or mixing step}
7/364 . . {Avoiding environmental pollution during cement-manufacturing}

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 . 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 $CaSO_4$-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)

11/06 . 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 desulfurisation 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}
12/007 . {Non-hydraulic cements containing low lime calcium silicate phases, e.g. wollastonite, pseudowollastonite, rankinite or cements curable in the presence of CO_2}
12/02 . Phosphate cements (in, or for, the manufacture of ceramics C04B 33/00, C04B 35/00)
12/022 . . {Al-phosphates}
12/025 . . {Phosphates of ammonium or of the alkali or alkaline earth metals}
12/027 . . {mixtures thereof with other inorganic cementitious materials}
12/04 . Alkali metal or ammonium silicate cements {; Alkyl silicate cements; Silica sol cements; Soluble silicate cements (alkali metal silicates per se, their preparation C01B 33/32; ammonium silicates per se, their preparation C01C 1/00)}

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

14/00 Use of inorganic materials as fillers, e.g. pigments, for mortars, 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. colloïdal 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, slate (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 vermiculate}
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
14/361 . . . {Soil, e.g. laterite}
14/363 . . . {Ferrites}
14/365 . . . {Gypsum (synthetic gypsum C04B 18/0445, C04B 18/064)}
14/366 . . . {Phosphates, e.g. apatite}
14/368 . . . {Baryte}
14/38 . Fibrous materials; Whiskers
14/383 . . {Whiskers}
14/386 . . {Carbon (carbon nanotubes C04B 14/026)}
14/40 . . Asbestos
14/42 . . Glass
14/44 . . . Treatment for enhancing alkali resistance {(composition of alkali resistant glass fibres C03C 13/00; coating of glass fibres C03C 25/10)}
14/46 . . Rock wool {; Ceramic or silicate fibres (C04B 14/40, C04B 14/42 take precedence)}
14/4606 . . . {added as organic or organo-mineral precursors}
14/4612 . . . {Al-borates}
14/4618 . . . {Oxides}
14/4625 . . . . {Alumina}
14/4631 . . . . {Silica}
14/4637 . . . {Zirconia or zircon}
14/4643 . . . {Silicates other than zircon}
14/465 . . . . {Ca-silicate, e.g. wollastonite}
14/4656 . . . . {Al-silicates, e.g. clay}
14/4662 . . . . {Polysilicates, e.g. geopolymers}
14/4668 . . . . {of vulcanic origin}
14/4675 . . . . {from slags}
14/4681 . . . {Titanates}
14/4687 . . . {Non-oxide ceramics (carbon or graphite fibres C04B 14/386)}
14/4693 . . . . {Silicon carbide}
14/48 . . Metal

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

NOTE

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

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

18/00 Use of agglomerated or waste materials or refuse as fillers for mortars, concrete or artificial stone (use of waste materials for the manufacture of cement C04B 7/24)**; Treatment of agglomerated or waste materials or refuse, specially adapted to enhance their filling properties in mortars, concrete or artificial stone**

NOTE

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

18/02 . Agglomerated materials {, e.g. artificial aggregates}
18/021 . . {agglomerated by a mineral binder, e.g. cement}
18/022 . . {agglomerated by an organic binder}
18/023 . . {Fired or melted materials}
18/025 . . . {Grog}
18/026 . . . {Melted materials (C04B 14/22 takes precedence)}
18/027 . . {Lightweight materials}
18/028 . . {temporarily agglomerated, e.g. agglomerates which fall apart during mixing with the other mortar or concrete ingredients}
18/04 . Waste materials; Refuse
18/0409 . . {Waste from the purification of bauxite, e.g. red mud}
18/0418 . . {Wet materials, e.g. slurries}
18/0427 . . {Dry materials}
18/0436 . . {Dredged harbour or river sludge (other slurries or sludges C04B 18/0418)}
18/0445 . . {Synthetic gypsum, e.g. phosphogypsum (gypsum from smoke purification C04B 18/064)}
18/0454 . . {Bleaching earth}
18/0463 . . {Hazardous waste}
18/0472 . . . {Waste material contaminated by heavy metals}
18/0475 . . {Waste asbestos}
18/0481 . . {Other specific industrial waste materials not provided for elsewhere in C04B 18/00}
18/049 . . . {Wastes from oil or other wells, e.g. drilling mud}

18/06 . . Combustion residues, e.g. purification products of smoke, fumes or exhaust gases
18/061 . . . {Ashes from fluidised bed furnaces}
18/062 . . . {Purification products of smoke, fume or exhaust-gases}
18/064 . . . . {Gypsum}
18/065 . . . {Residues from coal gasification}
18/067 . . . {Slags}
18/068 . . . {from burning wood}
18/08 . . . Flue dust {, i.e. fly ash}
18/081 . . . . {from brown coal or lignite}
18/082 . . . . {Cenospheres}
18/084 . . . . {obtained from mixtures of pulverised coal and additives, added to influence the composition of the resulting flue dust}
18/085 . . . . {Pelletizing}
18/087 . . . . {from liquid fuels, e.g. oil}
18/088 . . . . {in high volume fly ash compositions}
18/10 . . . Burned {or pyrolised} refuse
18/101 . . . . {Burned rice husks or other burned vegetable material}
18/103 . . . . {Burned or pyrolised sludges}
18/105 . . . . {Gaseous combustion products or dusts collected from waste incineration, e.g. sludge resulting from the purification of gaseous combustion products of waste incineration}
18/106 . . . . . {Fly ash from waste incinerators}
18/108 . . . . {involving a melting step}
18/12 . . from quarries, mining or the like
18/125 . . . {Slate residues, e.g. colliery shale or oil shale or oil shale ash}
18/14 . . from metallurgical processes (treatment of molten slag C04B 5/00)
18/141 . . . {Slags}
18/142 . . . . {Steelmaking slags, converter slags}
18/143 . . . . . {L.D. slags, i.e. Linz-Donawitz slags}
18/144 . . . . {Slags from the production of specific metals other than iron or of specific alloys, e.g. ferrochrome slags}
18/145 . . . . {Phosphorus slags}
18/146 . . . {Silica fume}
18/147 . . . . {Conditioning}
18/148 . . . . . {Preparing silica fume slurries or suspensions}
18/149 . . . {other than silica fume or slag}
18/16 . . from building or ceramic industry
18/162 . . . Cement kiln dust; Lime kiln dust
18/165 . . . Ceramic waste
18/167 . . . Recycled materials, i.e. waste materials reused in the production of the same materials
18/18 . . organic (C04B 18/10 takes precedence)
18/20 . . . from macromolecular compounds
18/22 . . . . Rubber {, e.g. ground waste tires}
18/24 . . . Vegetable refuse, e.g. rice husks, maize-ear refuse; Cellulosic materials, e.g. paper {, cork}
18/241 . . . . {Paper, e.g. waste paper; Paper pulp}
18/243 . . . . . {Waste from paper processing or recycling paper, e.g. de-inking sludge (burned paper processing waste C04B 18/10)}
18/245 . . . . {Cork; Bark}
18/246 . . . . {expanded}
18/248 . . . . {from specific plants, e.g. hemp fibres}
18/26 . . . . Wood, e.g. sawdust, wood shavings
18/265 . . . . . {from specific species, e.g. birch}
18/28 . . . . Mineralising; Compositions therefor
18/30 . . Mixed waste; Waste of undefined composition, (C04B 18/10 takes precedence)
18/305 . . . {Municipal waste}

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

NOTE

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

20/0004 . {Microcomposites or nanocomposites, e.g. composite particles obtained by polymerising monomers onto inorganic materials}
20/0008 . {Materials specified by a shape not covered by C04B 20/0016 - C04B 20/0056, e.g. nanotubes}
20/0012 . . {Irregular shaped fillers}
20/0016 . {Granular materials, e.g. microballoons}
20/002 . . {Hollow or porous granular materials}
20/0024 . . . {expanded in situ, i.e. the material is expanded or made hollow after primary shaping of the mortar, concrete or artificial stone mixture (C04B 16/085 takes precedence)}
20/0028 . . . {crushable}
20/0032 . . . {characterised by the gas filling pores, e.g. inert gas or air at reduced pressure}
20/0036 . . . {Microsized or nanosized}
20/004 . . . {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}
20/02 . Treatment
20/023 . . {Chemical treatment}
20/026 . . {Comminuting, e.g. by grinding or breaking; Defibrillating fibres other than asbestos}

20/04 . . Heat treatment
20/06 . . . Expanding clay, perlite, vermiculite or like granular materials
20/061 . . . . {in rotary kilns}
20/063 . . . . {by grate sintering}
20/065 . . . . {in fluidised beds}
20/066 . . . . {in shaft or vertical furnaces}
20/068 . . . . {Selection of ingredients added before or during the thermal treatment, e.g. expansion promoting agents or particle-coating materials}
20/08 . . Defibrillating asbestos {(defibrillating other fibres C04B 20/026)}
20/10 . Coating or impregnating {(roofing granules E04D 7/005)}
20/1003 . . {Non-compositional aspects of the coating or impregnation}
20/1007 . . . {Porous or lightweight coatings}
20/1011 . . . {Temporary coatings}
20/1014 . . . {Coating or impregnating materials characterised by the shape, e.g. fibrous materials}
20/1018 . . {with organic materials (pigments or dyes C04B 20/1096)}
20/1022 . . . {Non-macromolecular compounds}
20/1025 . . . . {Fats; Fatty oils; Ester type waxes; Higher fatty acids; Derivatives thereof}
20/1029 . . . {Macromolecular compounds}
20/1033 . . . . {obtained by reactions only involving carbon-to-carbon unsaturated bonds}
20/1037 . . . . {obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds}
20/104 . . . . {Natural resins, e.g. tall oil}
20/1044 . . . . {Bituminous materials}
20/1048 . . . . {Polysaccharides, e.g. cellulose, or derivatives thereof}
20/1051 . . {Organo-metallic compounds; Organo-silicon compounds, e.g. bentone}
20/1055 . . {with inorganic materials}
20/1059 . . . {Pigments or precursors thereof}
20/1062 . . . {Metals}
20/1066 . . . {Oxides, Hydroxides}
20/107 . . . {Acids or salts thereof}
20/1074 . . . {Silicates, e.g. glass}
20/1077 . . . {Cements, e.g. waterglass}
20/1081 . . . . {Mineral polymers, e.g. geopolymers}
20/1085 . . . . {Waterglass}
20/1088 . . . {Water}
20/1092 . . {with pigments or dyes (C04B 20/1059 takes precedence)}
20/1096 . . . {organic}
20/12 . . Multiple coating or impregnating
20/123 . . . {Multiple coatings, for one of the coatings of which at least one alternative is described}
20/126 . . . {Multiple coatings, comprising a coating layer of the same material as a previous coating layer}

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}
22/00863 . . {Calcium silicate hydrate}
22/00867 . . {Ettringite}
22/0093 . {Aluminates}
22/02 . Elements
22/04 . . Metals, e.g. aluminium used as blowing agent
22/06 . Oxides, Hydroxides (C04B 22/0013 takes precedence)
22/062 . . {of the alkali or alkaline-earth metals}
22/064 . . . {of the alkaline-earth metals}
22/066 . . {Magnesia; Magnesium hydroxide}
22/068 . . {Peroxides, e.g. hydrogen peroxide}
22/08 . Acids or salts thereof {(C04B 22/0013 takes precedence)}
22/082 . . {Acids}
22/085 . . {containing nitrogen in the anion, e.g. nitrites}
22/087 . . {containing chromium in the anion, e.g. chromates}
22/10 . . containing carbon in the anion
22/103 . . . {Acids}
22/106 . . . {Bicarbonates}
22/12 . . containing halogen in the anion
22/122 . . . {Acids}
22/124 . . . {Chlorides of ammonium or of the alkali or alkaline earth metals, e.g. calcium chloride}
22/126 . . . {Fluorine compounds, e.g. silico-fluorine compounds}
22/128 . . . {Bromine compounds}
22/14 . . containing sulfur in the anion, e.g. sulfides
22/141 . . . {Acids}
22/142 . . . {Sulfates}
22/143 . . . . {Calcium-sulfate}

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

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

NOTE

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

24/001 . {Waste organic materials}
24/003 . {Phosphorus-containing compounds}
24/005 . {Halogen-containing compounds}
24/006 . {Boron-containing compounds}
24/008 . {Aldehydes, ketones}
24/02 . Alcohols; Phenols; Ethers
24/023 . . {Ethers}
24/026 . . {Fatty alcohols}
24/04 . Carboxylic acids; Salts, anhydrides or esters thereof
24/045 . . {Esters, e.g. lactones}
24/06 . . containing hydroxy groups
24/08 . Fats; Fatty oils; Ester type waxes; Higher fatty acids, i.e. having at least seven carbon atoms in an unbroken chain bound to a carboxyl group; Oxidised oils or fats
24/085 . . {Higher fatty acids}
24/10 . Carbohydrates or derivatives thereof
24/12 . Nitrogen containing compounds {organic derivatives of hydrazine (hydrazine C04B 22/00)}
24/121 . . {Amines, polyamines}
24/122 . . {Hydroxy amines}
24/123 . . {Amino-carboxylic acids}
24/124 . . {Amides}
24/125 . . {Compounds containing one or more carbon-to-nitrogen double or triple bonds, e.g. imines}
24/126 . . {Urea}
24/127 . . {Nitro-compounds}
24/128 . . {Heterocyclic nitrogen compounds}
24/129 . . {Compounds containing one or more nitrogen-to-nitrogen double bonds, e.g. azo-compounds}
24/14 . . Peptides; Proteins; Derivatives thereof
24/16 . Sulfur-containing compounds
24/161 . . {Macromolecular compounds comprising sulfonate or sulfate groups}
24/163 . . . {obtained by reactions only involving carbon-to-carbon unsaturated bonds}
24/165 . . . . {containing polyether side chains}
24/166 . . . {obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds}
24/168 . . . {Polysaccharide derivatives, e.g. starch sulfate}
24/18 . . Lignin sulfonic acid or derivatives thereof, e.g. sulfite lye
24/20 . . Sulfonated aromatic compounds
24/22 . . . Condensation {or polymerisation} products thereof

NOTE

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

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

NOTE

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

24/302 . . . . {Phenol-formaldehyde condensation polymers}
24/305 . . . . {Melamine-formaldehyde condensation polymers}

24/307 . . . . {Urea-formaldehyde condensation polymers}
24/32 . . . Polyethers, e.g. alkylphenol polyglycolether
24/34 . . Natural resins, e.g. rosin {(C04B 24/243 takes precedence)}
24/36 . . Bituminous materials, e.g. tar, pitch {(C04B 24/243 takes precedence)}
24/38 . . Polysaccharides or derivatives thereof {(C04B 24/243 takes precedence)}
24/383 . . . {Cellulose or derivatives thereof}
24/386 . . . . {containing polyether side chains}
24/40 . Compounds containing silicon, titanium or zirconium {or other organo-metallic compounds; Organo-clays; Organo-inorganic complexes}
24/405 . . {Organo-inorganic complexes}
24/42 . . Organo-silicon compounds
24/425 . . . {Organo-modified inorganic compounds, e.g. organo-clays}

Compositions of mortars, concrete or artificial stone (artificial stone from molten slag C04B 5/00)

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-polymers}
26/12 . . . Condensation polymers of aldehydes or ketones

NOTE

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

26/122 . . . . {Phenol-formaldehyde condensation polymers}
26/125 . . . . {Melamine-formaldehyde condensation polymers}
26/127 . . . . {Urea formaldehyde condensation polymers}
26/14 . . . Polyepoxides
26/16 . . . Polyurethanes
26/18 . . . Polyesters; Polycarbonates
26/20 . . . Polyamides
26/22 . . Natural resins, e.g. rosin
26/24 . . . Cellulosic waste liquor, e.g. sulfite lye
26/26 . . Bituminous materials, e.g. tar, pitch {(C08L 95/00 takes precedence)}
26/28 . . Polysaccharides or derivatives thereof
26/285 . . . {Cellulose or derivatives thereof (C04B 26/24 takes precedence)}
26/30 . Compounds having one or more carbon-to-metal or carbon-to-silicon linkages {; Other silicon-containing organic compounds; Boron-organic compounds}
26/32 . . containing silicon

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

NOTE

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

28/001 . {containing unburned clay (polymer binder - clay mixtures used in well cementing C09K 8/44)}
28/003 . {containing hybrid binders other than those of the polycarboxylate type}
28/005 . {containing gelatineous or gel forming binders, e.g. gelatineous Al(OH)3, sol-gel binders}
28/006 . {containing mineral polymers, e.g. geopolymers of the Davidovits type}
28/008 . . {Mineral polymers other than those of the Davidovits type, e.g. from a reaction mixture containing waterglass}
28/02 . 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 slags from waste incineration (alkali-activated combustion residues as such C04B 7/243; mixtures of the lime-pozzuolane type C04B 28/18); Kiln 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}

28/143 . . . {the synthetic calcium sulfate being phosphogypsum}
28/144 . . . {the synthetic calcium sulfate being a flue gas desulfurization product}
28/145 . . {Calcium sulfate hemi-hydrate with a specific crystal form}
28/146 . . . {alpha-hemihydrate}
28/147 . . . {beta-hemihydrate}
28/148 . . {containing calcium sulfate formed in situ, e.g. by the reaction of iron sulfate with lime}
28/16 . . containing anhydrite {, e.g. Keene's cement}
28/165 . . . {containing synthetic anhydrite}
28/18 . containing mixtures of the silica-lime type
28/182 . . {based on calcium silicate forming mixtures not containing lime or lime producing ingredients, e.g. waterglass based mixtures heated with a calcium salt}
28/184 . . {based on an oxide other than lime}
28/186 . . {containing formed Ca-silicates before the final hardening step}
28/188 . . . {the Ca-silicates being present in the starting mixture}
28/24 . containing alkyl, ammonium or metal silicates; containing silica sols {(reaction mixtures resulting in mineral polymers C04B 28/006; polymeric reaction products of alkali metal silicates with isocyanates C08G 18/3895)}
28/26 . . Silicates of the alkali metals
28/28 . containing organic polyacids, e.g. polycarboxylate cements {, i.e. ionomeric systems}
28/30 . containing magnesium cements {or similar cements}(magnesium oxide cements C04B 28/10)
28/32 . . Magnesium oxychloride cements, e.g. Sorel cement
28/34 . containing cold phosphate binders

NOTE

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

28/342 . . {the phosphate binder being present in the starting composition as a mixture of free acid and one or more reactive oxides}
28/344 . . {the phosphate binder being present in the starting composition solely as one or more phosphates}
28/346 . . {the phosphate binder being present in the starting composition as a mixture of free acid and one or more phosphates}
28/348 . . . {the starting mixture also containing one or more reactive oxides}
28/36 . containing sulfur, sulfides or selenium
28/365 . . {containing sulfides or selenium}

30/00 Compositions for artificial stone, not containing binders

30/02 . containing fibrous materials

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

32/005 . {Artificial stone obtained by melting at least part of the composition, e.g. metal (C04B 28/36 and C03C take precedence; cast stone from molten slag C04B 5/00; artificial stone obtained by melting the polymeric ingredient of the composition C04B 26/00)}
32/02 . with reinforcements {(contains no documents; reinforcing elements E04C 5/00)}

NOTE

This group is only used for indexing purposes

Ceramics

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

NOTE

{In groups C04B 33/00 - C04B 33/36, the indexing codes of groups C04B 2235/00 - C04B 2235/9646 are used (with the exception of C04B 2235/349, C04B 2235/6027, C04B 2235/604 and C04B 2235/9661) to identify aspects relating to ceramic starting mixtures and sintered ceramic products.}

33/02 . Preparing or treating the raw materials individually or as batches
33/025 . . {Mixtures of materials with different sizes}
33/04 . . Clay; Kaolin
33/06 . . . Rendering lime harmless
33/08 . . . . Preventing efflorescence
33/10 . . Eliminating iron or lime
33/13 . . Compounding ingredients (C04B 33/36, C04B 35/71 take precedence {; pigments for ceramics C09C 1/0009})
33/1305 . . . {Organic additives}
33/131 . . . {Inorganic additives}
33/1315 . . . {Non-ceramic binders}
33/132 . . . Waste materials; Refuse; {Residues}(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
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 ($ZrSiO_4$)
35/107 . . . Refractories by fusion casting
35/109 . . . . containing zirconium oxide or zircon ($ZrSiO_4$)
35/111 . . . Fine ceramics
35/1115 . . . . {Minute sintered entities, e.g. sintered abrasive grains or shaped particles such as platelets (abrasives C09K 3/14)}
35/113 . . . . based on beta-aluminium oxide
35/115 . . . . Translucent or transparent products
35/117 . . . . Composites
35/119 . . . . . with zirconium oxide
35/12 . . based on chromium oxide (C04B 35/047 and C04B 35/105 take precedence)
35/14 . . based on silica
35/16 . . based on silicates other than clay {(zircon C04B 35/48)}
35/18 . . . rich in aluminium oxide
35/185 . . . . Mullite {3Al2O3-2SiO2}
35/19 . . . . Alkali metal aluminosilicates, e.g. spodumene
35/195 . . . . Alkaline earth aluminosilicates, e.g. cordierite {or anorthite}
35/20 . . . rich in magnesium oxide {, e.g. forsterite (C04B 35/195 takes precedence)}
35/22 . . . rich in calcium oxide {, e.g. wollastonite (C04B 35/195 takes precedence)}
35/26 . . based on ferrites
35/2608 . . . {Compositions containing one or more ferrites of the group comprising manganese, zinc, nickel, copper or cobalt and one or more ferrites of the group comprising rare earth metals, alkali metals, alkaline earth metals or lead}
35/2616 . . . . {containing lithium}
35/2625 . . . . {containing magnesium}
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 or zinc and 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 35/047 and C04B 35/105 take precedence)
35/44 . . based on aluminates
35/443 . . . Magnesium aluminate spinel
35/447 . . 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. zincates, 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 $BaTiO_3$ perovskite phase}
35/4684 . . . . . {containing lead compounds (C04B 35/472 takes precedence)}
35/4686 . . . . . {based on phases other than $BaTiO_3$ perovskite phase}
35/4688 . . . . . {containing lead compounds (C04B 35/472 takes precedence)}
35/47 . . . . . based on strontium titanates
35/472 . . . . based on lead titanates
35/475 . . . . based on bismuth titanates
35/478 . . . . based on aluminium titanates
35/48 . . based on zirconium or hafnium oxides, zirconates, {zircon} or hafnates
35/481 . . . {containing silicon, e.g. zircon}
35/482 . . . Refractories from grain sized mixtures
35/484 . . . Refractories by fusion casting
35/486 . . . Fine ceramics
35/488 . . . . Composites
35/4885 . . . . . {with aluminium oxide}
35/49 . . . containing also titanium oxides or titanates
35/491 . . . . based on lead zirconates and lead titanates {, e.g. PZT}
35/493 . . . . . containing also other lead compounds
35/495 . . based on vanadium, niobium, tantalum, molybdenum or tungsten oxides or solid solutions thereof with other oxides, e.g. vanadates, niobates, tantalates, molybdates or tungstates
35/497 . . . based on solid solutions with lead oxides
35/499 . . . . containing also titanates
35/50 . based on rare-earth compounds {(non-oxide rare earth compounds C04B 35/5156)}
35/505 . . based on yttrium oxide
35/51 . based on compounds of actinides ({non-oxide actinide compounds C04B 35/5158;} nuclear fuel materials G21C 3/62)
35/515 . based on non-oxide ceramics
35/5152 . . {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 oxycarbides (containing free metal binder C22C 29/00)}
35/5603 . . . {with a well-defined oxygen content, e.g. oxycarbides}
35/5607 . . . {based on refractory metal carbides}
35/5611 . . . . {based on titanium carbides}
35/5615 . . . . . {based on titanium silicon carbides}
35/5618 . . . . . {based on titanium aluminium carbides}
35/5622 . . . . {based on zirconium or hafnium carbides}
35/5626 . . . . {based on tungsten carbides}
35/563 . . . based on boron carbide
35/565 . . . based on silicon carbide
35/571 . . . . obtained from {Si-containing} polymer precursors {or organosilicon monomers}
35/573 . . . . obtained by reaction sintering {or recrystallisation}
35/575 . . . . obtained by pressure sintering
35/5755 . . . . . {obtained by gas pressure sintering}
35/58 . . based on borides, nitrides, {i.e. nitrides, oxynitrides, carbonitrides or oxycarbonitrides} or silicides {(containing free binder metal C22C 29/00)}
35/58007 . . . {based on refractory metal nitrides}
35/58014 . . . . {based on titanium nitrides, e.g. TiAlON}
35/58021 . . . . . {based on titanium carbonitrides}
35/58028 . . . . {based on zirconium or hafnium nitrides}
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. MgB_2}
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 woody 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. by using temporary supports}
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 phosphorus 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 . . . . {Milling}
35/62615 . . . . . {High energy or reactive ball milling}
35/6262 . . . . . {of calcined, sintered clinker or ceramics}
35/62625 . . . . {Wet mixtures}
35/6263 . . . . . {characterised by their solids loadings, i.e. the percentage of solids}
35/62635 . . . . . {Mixing details}
35/6264 . . . . . {Mixing media, e.g. organic solvents}
35/62645 . . . . {Thermal treatment of powders or mixtures thereof other than sintering}
35/6265 . . . . . {involving reduction or oxidation}
35/62655 . . . . . {Drying, e.g. freeze-drying, spray-drying, microwave or supercritical drying}
35/6266 . . . . . {Humidity controlled drying}
35/62665 . . . . . {Flame, plasma or melting treatment}
35/6267 . . . . . {Pyrolysis, carbonisation or auto-combustion reactions}
35/62675 . . . . . {characterised by the treatment temperature}
35/6268 . . . . . {characterised by the applied pressure or type of atmosphere, e.g. in vacuum, hydrogen or a specific oxygen pressure}
35/62685 . . . . {characterised by the order of addition of constituents or additives}
35/6269 . . . . {Curing of mixtures}
35/62695 . . . . {Granulation or pelletising (devices for shaping artificial aggregates from ceramic mixtures B28B 1/004)}
35/628 . . . Coating the powders {or the macroscopic reinforcing agents}
35/62802 . . . . {Powder coating materials}
35/62805 . . . . . {Oxide ceramics}
35/62807 . . . . . {Silica or silicates}
35/6281 . . . . . {Alkaline earth metal oxides}
35/62813 . . . . . {Alumina or aluminates}
35/62815 . . . . . {Rare earth metal oxides}
35/62818 . . . . . {Refractory metal oxides}
35/62821 . . . . . {Titanium oxide}
35/62823 . . . . . {Zirconium or hafnium oxide}
35/62826 . . . . . {Iron group metal oxides}
35/62828 . . . . . {Non-oxide ceramics}
35/62831 . . . . . {Carbides}
35/62834 . . . . . {Silicon carbide}
35/62836 . . . . . {Nitrides}
35/62839 . . . . . {Carbon}
35/62842 . . . . . {Metals}
35/62844 . . . . {Coating fibres}
35/62847 . . . . . {with oxide ceramics}
35/62849 . . . . . {Silica or silicates}

35/62852 . . . . . {Alumina or aluminates}
35/62855 . . . . . {Refractory metal oxides}
35/62857 . . . . {with non-oxide ceramics}
35/6286 . . . . . {Carbides}
35/62863 . . . . . {Silicon carbide}
35/62865 . . . . . {Nitrides}
35/62868 . . . . . {Boron nitride}
35/62871 . . . . . {Silicon nitride}
35/62873 . . . . . {Carbon}
35/62876 . . . . {with metals}
35/62878 . . . . {with boron or silicon}
35/62881 . . . . {with metal salts, e.g. phosphates}
35/62884 . . . {by gas phase techniques}
35/62886 . . . {by wet chemical techniques}
35/62889 . . . {with a discontinuous coating layer}
35/62892 . . . {with a coating layer consisting of particles}
35/62894 . . . {with more than one coating layer}
35/62897 . . . {Coatings characterised by their thickness}
35/63 . . . using additives specially adapted for forming the products {, e.g.. binder binders}
35/6303 . . . {Inorganic additives}
35/6306 . . . . {Binders based on phosphoric acids or phosphates}
35/6309 . . . . . {Aluminium phosphates}
35/6313 . . . . . {Alkali metal or alkaline earth metal phosphates}
35/6316 . . . . {Binders based on silicon compounds}
35/632 . . . Organic additives
35/6325 . . . . {based on organo-metallic compounds}
35/634 . . . . Polymers (C04B 35/636 takes precedence)
35/63404 . . . . . {obtained by reactions only involving carbon-to-carbon unsaturated bonds}
35/63408 . . . . . {Polyalkenes}
35/63412 . . . . . {Coumarone polymers}
35/63416 . . . . . {Polyvinylalcohols [PVA]; Polyvinylacetates}
35/6342 . . . . . {Polyvinylacetals, e.g. polyvinylbutyral [PVB]}
35/63424 . . . . . {Polyacrylates; Polymethacrylates}
35/63428 . . . . . {of ethylenically unsaturated dicarboxylic acid anhydride polymers, e.g. maleic anhydride copolymers}
35/63432 . . . . . {Polystyrenes}
35/63436 . . . . . {Halogen-containing polymers, e.g. PVC}
35/6344 . . . . . {Copolymers containing at least three different monomers}
35/63444 . . . . . {Nitrogen-containing polymers, e.g. polyacrylamides, polyacrylonitriles, polyvinylpyrrolidone [PVP], polyethylenimine [PEI]}
35/63448 . . . . . {obtained otherwise than by reactions only involving carbon-to-carbon unsaturated bonds}
35/63452 . . . . . {Polyepoxides}
35/63456 . . . . . {Polyurethanes; Polyisocyanates}
35/6346 . . . . . {Polyesters}
35/63464 . . . . . {Polycarbonates}
35/63468 . . . . . {Polyamides}
35/63472 . . . . . {Condensation polymers of aldehydes or ketones}

NOTE

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

35/63476 . . . . . {Phenol-formaldehyde condensation polymers}
35/6348 . . . . . {Melamine-formaldehyde condensation polymers}
35/63484 . . . . . {Urea-formaldehyde condensation polymers}
35/63488 . . . . . {Polyethers, e.g. alkylphenol polyglycolether, polyethylene glycol [PEG], polyethylene oxide [PEO]}
35/63492 . . . . . {Natural resins, e.g. rosin}
35/63496 . . . . . {Bituminous materials, e.g. tar, pitch}
35/636 . . . . Polysaccharides or derivatives thereof
35/6365 . . . . . {Cellulose or derivatives thereof}
35/638 . . . Removal thereof
35/64 . . Burning or sintering processes (C04B 33/32 takes precedence {; powder metallurgy B22F})
35/645 . . . Pressure sintering
35/6455 . . . . {Hot isostatic pressing}
35/65 . . . Reaction sintering of free metal- or free silicon-containing compositions {(C04B 35/573, C04B 35/591 take precedence)}
35/651 . . . . {Thermite type sintering, e.g. combustion sintering}
35/652 . . . . {Directional oxidation or solidification, e.g. 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 F27D 1/16)}
35/71 . Ceramic products containing macroscopic reinforcing agents (C04B 35/66 takes precedence {; infiltration of a porous ceramic matrix with a material forming a non-ceramic phase C04B 41/00, reaction infiltration with Si in order to form SiC C04B 35/573, in order to form Si_3N_4 C04B 35/591})

NOTE

In groups C04B 35/71 - C04B 35/83 the composition of the ceramic products is also classified in groups C04B 35/01 - C04B 35/597

35/74 . . containing shaped metallic materials
35/76 . . . Fibres, filaments, whiskers, platelets, or the like
35/78 . . containing non-metallic materials
35/80 . . . Fibres, filaments, whiskers, platelets, or the like
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** {(soldering and welding materials B23K 35/24; laminated products B32B, E04C)}

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.}

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 37/028 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}

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 35/536})

NOTES

1. Porous mortars, concrete, artificial stone or ceramic ware characterised by the ingredients or compositions are also classified in groups C04B 2/00 - C04B 35/00.
2. {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.}

38/0003 . {containing continuous channels, e.g. of the "dead-end" type or obtained by pushing bars in the green ceramic product (B28B takes precedence)}
38/0006 . {Honeycomb structures (from one or more corrugated sheets by winding or stacking C04B 38/0083)}
38/0009 . . {characterised by features relating to the cell walls, e.g. wall thickness or distribution of pores in the walls}
38/0012 . . {characterised by the material used for sealing or plugging (some of) the channels of the honeycombs}
38/0016 . . {assembled from subunits}
38/0019 . . . {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 }

38/0022 . {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}
38/0025 . . {starting from inorganic materials only, e.g. metal foam; Lanxide type products}
38/0029 . . {Porous deposits from the gas phase, e.g. on a temporary support}
38/0032 . . {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}
38/0035 . . {by evaporation induced self-assembly}
38/0038 . {by superficial sintering or bonding of particulate matter}
38/0041 . . {the particulate matter having preselected particle sizes}
38/0045 . {by a process involving the formation of a sol or a gel, e.g. sol-gel or precipitation processes}
38/0048 . . {Precipitation processes}
38/0051 . {characterised by the pore size, pore shape or kind of porosity}
38/0054 . . {the pores being microsized or nanosized}
38/0058 . . {open porosity}
38/0061 . . {closed porosity}
38/0064 . . {Multimodal pore size distribution}
38/0067 . {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

38/0074 . . {expressed as porosity percentage}
38/0077 . . {Materials with a non-porous skin}
38/008 . {Bodies obtained by assembling separate elements having such a configuration that the final product is porous or by spirally winding one or more corrugated sheets}
38/0083 . . {from one or more corrugated sheets or sheets bearing protrusions by winding or stacking}
38/0087 . {by generating pores in the ceramic material while in the molten state}
38/009 . {Porous or hollow ceramic granular materials, e.g. microballoons (C04B 18/027, C04B 20/002 take precedence)}

38/0093 . {Other features}
38/0096 . . {Pores with coated inner walls}
38/02 . 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 monolitic 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 monolitic 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}
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 38/0051 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 38/007 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 Hatscheck 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}
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 41/0072 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}

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, the following terms or expressions are used with the meanings indicated:
   - "mortars", "concrete" and "artificial stone" cover materials after primary shaping.
2. Treating, e.g. coating or impregnating, a material with the same material or with a substance that ultimately is transformed into the same material is not considered aftertreatment 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.
3. In groups C04B 41/45 - C04B 41/80, the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place.
4. {In this group, multiple classification is made according to the following rules:

C04B 41/00 (continued)

- 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 aspecific, classification is made only in the range C04B 41/00 - C04B 41/5392}

5. {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.}
6. {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 that are chosen from groups C04B 26/00 - C04B 38/00 should be unlinked.}
7. {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 that are chosen from groups C04B 41/00 - C04B 41/5392 should be unlinked.}
8. {Attention is drawn to internal Note (2) following the title of subclass C04B.}

41/0009 . {Demolition agents based on cementitous 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)}

41/0045 . {Irradiation; Radiation, e.g. with UV or IR (C04B 41/0036 takes precedence)}

41/0054 . {Plasma-treatment, e.g. with gas-discharge plasma}

41/0063 . {Cooling, e.g. freezing}

NOTE

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

41/0072 . {Heat treatment}

41/0081 . . {characterised by the subsequent cooling step}

41/009 . {characterised by the material treated}

41/45 . Coating or impregnating (paints C09D), {e.g. injection in masonry, partial coating of green or fired ceramics, organic coating compositions for adhering together two concrete elements (ion-implantation C04B 41/0027)}

NOTES

1. In group C04B 41/45 and sub-groups, as a general rule, classification is made according to the end products, rather than according to the starting materials, in the coating or impregnating compositions.
2. In groups C04B 41/45 - C04B 41/528 the following term is used with the meaning indicated:
   - "coating" covers material applied to the substrates as powdery material or applied from the gas or liquid phase, e.g. as a slurry; it only covers the use of preformed sheet-like elements in so far as the thickness of these sheets is small compared with the thickness of the substrate and so far as the resulting product is not exclusively one of the type classifiable in B32B

41/4501 . . {with preformed sheet-like elements}

41/4503 . . . {having an adhesive layer}

41/4505 . . {characterised by the method of application}

41/4507 . . . {using keying elements, e.g. particulate material, to facilitate the adherence of coating layers}

41/4509 . . . . {The keying element being generated from identations made in the substrate}

41/4511 . . . {using temporarily supports, e.g. decalcomania transfers or mould surfaces}

41/4513 . . . . {the temporary support- and coating material being mixed together, e.g. tile glazing paper sheets}

41/4515 . . . {application under vacuum or reduced pressure}

41/4517 . . . {application under inert, e.g. non-oxidising, atmosphere}

41/4519 . . . {application under an other specific atmosphere}

41/4521 . . . {application under increased pressure}

41/4523 . . . {applied from the molten state (vitreous materials C04B 41/5022); Thermal spraying, e.g. plasma spraying}

NOTE

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

41/4525 . . . . {using a molten bath as vehicle, e.g. molten borax}

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

41/4529 . . . {applied from the gas phase}

NOTE

Coating or impregnating with a specific material from the gas phase is classified according to the specific material and

C04B 41/4529 (continued)

symbol C04B 41/4529 is allocated in Combination Sets

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

NOTE

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

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

NOTE

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

41/4547 . . . . {characterised by the grain distribution}
41/4549 . . . . . {Nanometer-sized particles}
41/455 . . . {the coating or impregnating process including a chemical conversion or reaction}
41/4552 . . . . {the end product being obtained by a multistep reaction or conversion}
41/4554 . . . . {the coating or impregnating material being an organic or organo-metallic precursor of an inorganic material}
41/4556 . . . . {coating or impregnating with a product reacting with the substrate, e.g. generating a metal coating by surface reduction of a ceramic substrate}
41/4558 . . . . {Coating or impregnating involving the chemical conversion of an already applied layer, e.g. obtaining an oxide layer by oxidising an applied metal layer}
41/456 . . . . . {the conversion only taking place under certain conditions, e.g. avoiding damage of underlaying layers or parts of the substrate}
41/4562 . . . {Photographic methods, e.g. making use of photo-sensitive materials}
41/4564 . . . {Electrolytic or electrophoretic processes, e.g. electrochemical re-alkalisation of reinforced concrete (desalination C04B 41/53)}
41/4566 . . . . {Electrochemical re-alcalisation (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. perfluor-compounds}
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 . . . . {Polyesters}
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 . . . . . {Polyamides}
41/4896 . . . . . {Polyethers}
41/49 . . . Compounds having one or more carbon-to-metal or carbon-to-silicon linkages {; Organo-clay compounds; Organo-silicates, i.e. ortho- or polysilicic acid esters (to obtain SiO_2C04B 41/5089, C04B 41/5035); Organo-phosphorus compounds; Organo-inorganic complexes}

NOTE

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

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

NOTE

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

41/5023 . . . . {Glass-ceramics (compositions of glass-ceramics C03C 10/00)}
41/5024 . . . {Silicates (C04B 41/5022 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 . . . . . {Manganates}
41/5029 . . . . {Magnesia}
41/5031 . . . . {Alumina}
41/5032 . . . . . {Aluminates (aluminate spinels C04B 41/5046)}
41/5033 . . . . {Chromium oxide}
41/5035 . . . . {Silica}
41/5036 . . . . {Ferrites}
41/5037 . . . . {Clay, Kaolin}
41/5038 . . . . . {Porcelain}
41/504 . . . . . {Engobes}
41/5041 . . . . {Titanium oxide or titanates}
41/5042 . . . . {Zirconium oxides or zirconates; Hafnium oxides or hafnates}
41/5044 . . . . . {Hafnates}
41/5045 . . . . {Rare-earth oxides}
41/5046 . . . . {Spinels, e.g. magnesium aluminate spinels}
41/5048 . . . . {Phosphates}
41/5049 . . . . {Zinc or bismuth oxides}
41/505 . . . . {Tin oxide}
41/5051 . . . . {Niobium oxides or niobates}

41/5053 . . . {non-oxide ceramics (carbon or carbonisable materials C04B 41/5001)}
41/5054 . . . . {Sulfides or selenides}
41/5055 . . . . {Fluorides}
41/5057 . . . . {Carbides}
41/5058 . . . . . {Boron carbide}
41/5059 . . . . . {Silicon carbide}
41/5061 . . . . . {Titanium carbide}
41/5062 . . . . {Borides, Nitrides or Silicides}
41/5063 . . . . . {Aluminium nitride}
41/5064 . . . . . {Boron nitride}
41/5066 . . . . . {Silicon nitride}
41/5067 . . . . . {Silicon oxynitrides, e.g. SIALON}
41/5068 . . . . . {Titanium nitride}
41/507 . . . . . {Borides}
41/5071 . . . . . {Silicides}
41/5072 . . . {with oxides or hydroxides not covered by C04B 41/5025 (C04B 40/0236 takes precedence; boron oxide C04B 41/5006)}
41/5074 . . . . {Copper oxide or solid solutions thereof (CuO-Cu eutectic C04B 41/5127)}
41/5075 . . . . . {Copper oxide}
41/5076 . . . {with masses bonded by inorganic cements (sulfur compositions C04B 41/5097)}
41/5077 . . . . {Geopolymer cements}
41/5079 . . . . {Portland cements}
41/508 . . . . {Aluminous cements}
41/5081 . . . . . {Calcium alumino sulfate cements}
41/5083 . . . . {Slag cements}
41/5084 . . . . {Lime, hydraulic lime or magnesium oxide cements}
41/5085 . . . . {Calcium sulfate cements}
41/5087 . . . . . {Anhydrite}
41/5088 . . . . {Cementitious compositions of the silica-lime type}
41/5089 . . . . {Silica sols, alkyl, ammonium or alkali metal silicate cements}
41/509 . . . . {Magnesium cements, e.g. Sorel cement}
41/5092 . . . . {Phosphate cements}
41/5093 . . . {with elements other than metals or carbon (treatment with fluorine gas C04B 41/5019)}
41/5094 . . . . {Boron}
41/5096 . . . . {Silicon (C04B 35/573 takes precedence)}
41/5097 . . . . {Sulfur}
41/5098 . . . {Cermets}
41/51 . . . Metallising {, e.g. infiltration of sintered ceramic preforms with molten metal (covering materials with metals in general C23C; ceramic compositions containing free metal bonded to carbides, diamond, oxides, borides, nitrides, silicides, e.g. cermets, or other metal compounds, e.g. oxynitrides or sulfides, other than as macroscopic reinforcing agents C22C; infiltration of preforms containing free metal, e.g. cermets C22C)}
41/5105 . . . . {with a composition mainly composed of one or more of the noble metals or copper}
41/5111 . . . . {Ag, Au, Pd, Pt or Cu}
41/5116 . . . . {Ag or Au}
41/5122 . . . . {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 opposite charged particles or materials in the successive layers}
41/53 . involving the removal of at least part of the materials of the treated article, {e.g. etching, drying of hardened concrete (C04B 41/0036 - C04B 41/0054 take precedence)}
41/5307 . . {Removal of physically bonded water, e.g. drying of hardened concrete (E04B 1/7007 takes precedence)}
41/5315 . . {Cleaning compositions, e.g. for removing hardened cement from ceramic tiles}
41/5323 . . {to make grain visible, e.g. for obtaining exposed aggregate concrete}
41/533 . . . {Seeding methods, i.e. the exposed aggregates, at least partially, not making part of the starting mixture}
41/5338 . . {Etching (for obtaining decorative effects B44C 1/22; etching of specific electronic compounds, see the relevant places, e.g. etching of semiconductor bodies H01L 21/306)}
41/5346 . . . {Dry etching}
41/5353 . . . {Wet etching, e.g. with etchants dissolved in organic solvents}

41/5361 . . . {Etching with molten material}
41/5369 . . {Desalination, e.g. of reinforced concrete}
41/5376 . . . {Electrochemical desalination (electrochemical re-alkalisation C04B 41/4566; drying by electro-osmosis E04B 1/7007)}
41/5384 . . {by 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. ocratation
41/67 . . . . Phosphates
41/68 . . . . Silicic acid; Silicates
41/69 . . . . Metals
41/70 . . . for obtaining at least two superposed coatings having different compositions
41/71 . . . . at least one coating being an organic material
41/72 . . involving the removal of part of the materials of the treated articles, e.g. etching
41/80 . of only ceramics
41/81 . . Coating or impregnation
41/82 . . . with organic materials
41/83 . . . . Macromolecular compounds
41/84 . . . . Compounds having one or more carbon-to-metal of carbon-to-silicon linkages
41/85 . . . with inorganic materials
41/86 . . . . Glazes; Cold glazes
41/87 . . . . Ceramics
41/88 . . . . Metals
41/89 . . . for obtaining at least two superposed coatings having different compositions
41/90 . . . . at least one coating being a metal
41/91 . . involving the removal of part of the materials of the treated articles, e.g. etching

---

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

2103/0001 . {Living organisms, e.g. microorganisms, or enzymes}
2103/0002 . . {Seeds}
2103/0003 . {Unintentionally added compounds, such as impurities in raw materials, e.g. alkali sulfates in construction grade cement}
2103/0004 . {Compounds chosen for the nature of their cations}
2103/0005 . . {Organic ammonium compounds}
2103/0006 . . {Alkali metal or inorganic ammonium compounds}
2103/0007 . . . {K}
2103/0008 . . . {Li}
2103/0009 . . . {Inorganic ammonium compounds}
2103/001 . . {Alkaline earth metal or Mg-compounds}
2103/0011 . . . {Ba}
2103/0012 . . . {Mg}
2103/0013 . . {Iron group metal compounds}
2103/0014 . . . {Fe}
2103/0015 . . {Noble metal or copper compounds}
2103/0016 . . . {Cu}
2103/0017 . . {Refractory metal compounds}
2103/0018 . . . {Cr}
2103/0019 . . . {Ti}
2103/002 . . {Compounds of elements having a valency of 2}
2103/0021 . . {Compounds of elements having a valency of 3}
2103/0022 . . {Compounds of elements having a valency of 4}
2103/0023 . . {Compounds of elements having a valency of 5}
2103/0024 . . {Compounds of elements having a valency of 6}
2103/0025 . . {Compounds of the transition metals}
2103/0026 . {Compounds of unusual isotopes, e.g. heavy water}
2103/0027 . {Standardised cement types}
2103/0028 . . {according to API}
2103/0029 . . . {Type A}
2103/003 . . . {Type B}
2103/0031 . . . {Type C}
2103/0032 . . . {Type D}
2103/0033 . . . {Type E}
2103/0034 . . . {Type F}
2103/0035 . . . {Type G}
2103/0036 . . . {Type H}
2103/0037 . . . {Type J}
2103/0038 . . . {Type K}
2103/0039 . . {according to ASTM}
2103/004 . . {according to DIN}
2103/0041 . {Non-polymeric ingredients chosen for their physico-chemical characteristics}
2103/0042 . . {Amorphous materials}
2103/0043 . . {Compounds chosen for their specific Moh's hardness}
2103/0044 . . {Compounds chosen for their abrasion resistance, e.g. determined according to the L.A. test}
2103/0045 . {Polymers chosen for their physico-chemical characteristics}
2103/0046 . . {added as monomers or as oligomers}
2103/0047 . . . {as a mixture of nonomers and prepolymers or oligomers}
2103/0048 . . . {as oligomers}
2103/0049 . . {Water-swellable polymers}
2103/005 . . . {Alkali-swellable polymers}
2103/0051 . . {Water-absorbing polymers, hydrophilic polymers}
2103/0052 . . {Hydrophobic polymers}
2103/0053 . . {Water-soluble polymers}
2103/0054 . . {Water dispersible polymers}
2103/0055 . . {Water-insoluble polymers}
2103/0056 . . {Thermohardening polymers}
2103/0057 . . {added as redispersable powders}
2103/0058 . . {Core-shell polymers}
2103/0059 . . {Graft (co-)polymers}
2103/006 . . . {Comb polymers}
2103/0061 . . {Block (co-)polymers}
2103/0062 . . {Cross-linked polymers}
2103/0063 . . {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)}
2103/0064 . . {Polymers unstable in the presence of hydraulic binders, e.g. polymers flocculating in concrete mixtures}

2103/0065 . . {Polymers characterised by their glass transition temperature (Tg)}
2103/0066 . . {Film forming polymers}
2103/0067 . {the ingredients being formed in situ by chemical reactions or conversion of one or more of the compounds of the composition}
2103/0068 . {Ingredients with a function or property not provided for elsewhere in C04B 2103/00}
2103/0069 . . {the ingredients being characterised by their physical state}
2103/007 . . . {Supercritical fluids}
2103/0071 . . {Phase-change materials, e.g. latent heat storage materials used in concrete compositions}
2103/0072 . . {Biodegradable materials}
2103/0073 . . {Self-degrading materials, e.g. materials undergoing a hydrolytic degradation in the course of time}
2103/0074 . . {Anti-static agents}
2103/0075 . . {Anti-dusting agents}
2103/0076 . . {Deodorizing agents}
2103/0077 . . {Packaging material remaining in the mixture after the mixing step, e.g. soluble bags containing active ingredients}
2103/0078 . . {Sorbent materials}
2103/0079 . . {Rheology influencing agents}
2103/008 . . {Flocking or deflocking agents}
2103/0081 . . . {Deflocking agents}
2103/0082 . . {Segregation-preventing agents; Sedimentation-preventing agents}
2103/0083 . . . {Bleeding-preventing agents}
2103/0084 . . {Polyelectrolytes}
2103/0085 . . {Thixotropic agents}
2103/0086 . . {Chelating or complexing agents}
2103/0087 . . {Ion-exchanging agents}
2103/0088 . . {Compounds chosen for their latent hydraulic characteristics, e.g. pozzuolanes}

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.

2103/0089 . . {Agents for reducing heat of hydration}
2103/009 . . {Anhydrous vehicles for hydraulic cement compositions}
2103/0091 . . {Organic co-binders for mineral binder compositions}
2103/0092 . . . {for improving green strength}
2103/0093 . . {Organic cosolvents}
2103/0094 . . {Agents for altering or buffering the pH; Ingredients characterised by their pH}
2103/0095 . . {Oxidising agents}
2103/0096 . . {Reducing agents}
2103/0097 . . {Anion- and far-infrared-emitting materials}
2103/0098 . . {Radioactive materials}
2103/0099 . {Aspecific ingredients, i.e. high number of alternative specific compounds mentioned for the same function or property}
2103/10 . Accelerators; Activators
2103/105 . . {for reactions involving organo-silicon compounds}
2103/12 . . Set accelerators
2103/14 . . Hardening accelerators
2103/20 . Retarders
2103/22 . . Set retarders
2103/24 . . Hardening retarders
2103/30 . Water reducers, plasticisers, air-entrainers, flow improvers
2103/302 . . {Water reducers}
2103/304 . . {Air-entrainers}
2103/306 . . {Fluidisers with reduced air-entraning effect}
2103/308 . . {Slump-loss preventing agents}
2103/32 . . Superplasticisers
2103/34 . . {Flow improvers}
2103/40 . Surface-active agents, dispersants
2103/402 . . {anionic}
2103/404 . . {cationic}
2103/406 . . {non-ionic}
2103/408 . . {Dispersants}
2103/42 . Pore formers
2103/44 . Thickening, gelling or viscosity increasing agents
2103/445 . . {Gelling agents}
2103/46 . Water-loss or fluid-loss reducers, hygroscopic or hydrophilic agents, water retention agents
2103/465 . . {Water-sorbing agents, hygroscopic or hydrophilic agents}
2103/48 . Foam stabilisers
2103/50 . Defoamers, air detrainers
2103/52 . Grinding aids; Additives added during grinding
2103/54 . Pigments; Dyes
2103/56 . Opacifiers
2103/58 . . {Shrinkage reducing agents}
2103/60 . Agents for protection against chemical, physical or biological attack
2103/601 . . {Agents for increasing frost resistance}
2103/603 . . {Agents for controlling alkali-aggregate reactions}
2103/605 . . {UV-stabilising agents}
2103/606 . . {Agents for neutralising $Ca(OH)_2$ liberated during cement hardening}
2103/608 . . {Anti-oxidants}
2103/61 . . Corrosion inhibitors
2103/63 . . Flame-proofing agents
2103/65 . . Water proofers or repellants
2103/67 . . Biocides
2103/69 . . . Fungicides

2111/00 Mortars, concrete or artificial stone or mixtures to prepare them, characterised by specific function, property or use

2111/00008 . {Obtaining or using nanotechnology related materials}
2111/00017 . {Aspects relating to the protection of the environment}
2111/00025 . {Aspects relating to the protection of the health, e.g. materials containing special additives to afford skin protection (avoiding chromium eczema by using chromium VI-free or very low chromium VI-content materials C04B 2111/1081)}
2111/00034 . {Physico-chemical characteristics of the mixtures}

2111/00043 . . {Anhydrous mixtures}

NOTE

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

2111/00051 . . {Mortar or concrete mixtures with an unusual low cement content, e.g. for foundations}
2111/0006 . . . {for obtaining materials with the consistency of soil}
2111/00068 . . {Mortar or concrete mixtures with an unusual water/cement ratio}
2111/00077 . . {Partially hardened mortar or concrete mixtures}
2111/00086 . . {Mixtures with prolonged pot-life}
2111/00094 . . {Sag-resistant materials}
2111/00103 . . {Self-compacting mixtures}
2111/00112 . . {Mixtures characterised by specific pH values}
2111/0012 . . {Thixotropic mixtures}
2111/00129 . . {Extrudable mixtures}
2111/00137 . . {Injection moldable mixtures}
2111/00146 . . {Sprayable or pumpable mixtures}
2111/00155 . . . {Sprayable, i.e. concrete-like, materials able to be shaped by spraying instead of by casting, e.g. gunite}
2111/00163 . . . . {by the dry process}
2111/00172 . . . . {by the wet process}
2111/00181 . . {Mixtures specially adapted for three-dimensional printing (3DP), stereo-lithography or prototyping}
2111/00189 . . {Compositions or ingredients of the compositions characterised by analysis-spectra, e.g. NMR}
2111/00198 . . {Characterisation or quantities of the compositions or their ingredients expressed as mathematical formulae or equations}
2111/00206 . . {Compositions defined by their elemental analysis}
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}
2111/10 . Compositions or ingredients thereof characterised by the absence or the very low content of a specific material
2111/1006 . . {Absence of well-defined organic compounds}
2111/1012 . . . {Organic solvents}
2111/1018 . . {Gypsum free or very low gypsum content cement compositions}
2111/1025 . . {Alkali-free or very low alkali-content materials}
2111/1031 . . {Lime-free or very low lime-content materials}
2111/1037 . . {Cement free compositions, e.g. hydraulically hardening mixtures based on waste materials, not containing cement as such}
2111/1043 . . . {Calciumaluminate-free refractories}
2111/105 . . {Alumina-free or very low alumina-content materials}
2111/1056 . . {Silica-free or very low silica-content materials}
2111/1062 . . {Halogen free or very low halogen-content materials}
2111/1068 . . . {Halogens other than chlorine}
2111/1075 . . {Chromium-free or very low chromium-content materials}
2111/1081 . . . {Chromium VI, e.g. for avoiding chromium eczema (materials containing special additives for affording skin protection C04B 2111/00025)}
2111/1087 . . {Carbon free or very low carbon content fly ashes; Fly ashes treated to reduce their carbon content or the effect thereof}
2111/1093 . . . {Reducing the effect of the carbon content, without removing the carbon}
2111/12 . . Absence of mineral fibres, e.g. asbestos
2111/125 . . . {Mineral fibres other than asbestos}
2111/20 . Resistance against chemical, physical or biological attack
2111/2007 . . {Avoiding unauthorised or unwanted use or treatment}
2111/2015 . . {Sulfate resistance}
2111/2023 . . {Resistance against alkali-aggregate reaction}
2111/203 . . {Oil-proof or grease-repellant materials}
2111/2038 . . {Resistance against physical degradation}
2111/2046 . . . {Shock-absorbing materials}
2111/2053 . . . {Earthquake- or hurricane-resistant materials}
2111/2061 . . . {Materials containing photocatalysts, e.g. TiO_2, for avoiding staining by air pollutants or the like}
2111/2069 . . . {Self cleaning materials, e.g. using lotus effect (using photocatalysts C04B 2111/2061)}
2111/2076 . . . {Discolouring resistant materials (self cleaning materials C04B 2111/2069)}
2111/2084 . . {Thermal shock resistance}
2111/2092 . . {Resistance against biological degradation}
2111/21 . . Efflorescence resistance
2111/22 . . Carbonation resistance
2111/23 . . Acid resistance, e.g. against acid air or rain
2111/24 . . Sea water resistance
2111/25 . . Graffiti resistance; Graffiti removing
2111/26 . . Corrosion of reinforcement resistance
2111/265 . . . {Cathodic protection of reinforced concrete structures}
2111/27 . . Water resistance, i.e. waterproof or water-repellent materials
2111/275 . . . {Making materials water insoluble}
2111/28 . . Fire resistance, i.e. materials resistant to accidental fires or high temperatures
2111/285 . . . {Intumescent materials}
2111/29 . . {Frost-thaw resistance}
2111/30 . Nailable or sawable materials
2111/32 . Expansion-inhibited materials
2111/325 . . {the expansion being inhibited in one direction only}
2111/34 . Non-shrinking or non-cracking materials
2111/343 . . {Crack resistant materials}
2111/346 . . {Materials exhibiting reduced plastic shrinkage cracking}
2111/40 . Porous or lightweight materials
2111/42 . . Floating materials
2111/50 . Flexible or elastic materials

NOTE

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

2111/503 . . {Elastic materials}
2111/506 . . {Bendable material}
2111/52 . Sound-insulating materials

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

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

NOTE

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

2201/05 . Materials having an early high strength, e.g. allowing fast demoulding or formless casting
2201/10 . for the viscosity
2201/20 . for the density
2201/30 . for heat transfer properties such as thermal insulation values, e.g. R-values
2201/32 . . for the thermal conductivity, e.g. K-factors
2201/40 . for gas flow through the material
2201/50 . for the mechanical strength
2201/52 . . High compression strength concretes, i.e. with a compression strength higher than about 55 N/mm^2, e.g. reactive powder concrete [RPC]

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

NOTE

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

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

NOTE

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

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

NOTES

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

      The titania constituent of the starting mixture is not coded since it is to be expected that a single metal oxide is used to make a mixed metal oxide.
   b. it is not obvious from the "invention information" symbols that this constituent has been used to make the end product, e.g. if the "invention information" symbol given indicates that a zirconia-alumina composite is prepared it is common practice that zirconia and alumina constituents have been used and thus no codes for zirconia or alumina are given. In the same way, if an allocation indicates that an oxide ceramic contains carbon, no code for the addition of carbon is given. However for an alumina composite product comprising titania, the main symbol for composites based on alumina is given together with an indexing code for titania.
2. In groups C04B 2235/32 - C04B 2235/349 oxides are considered to comprise also metal salts from which they are formed by heating.

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 . . . . Aluminum 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 ($MgAl_2O_4$)
2235/3224 . . . . Rare earth oxide or oxide forming salts thereof, e.g. scandium oxide
2235/3225 . . . . . Yttrium oxide or oxide-forming salts thereof
2235/3227 . . . . . Lanthanum oxide or oxide-forming salts thereof
2235/3229 . . . . . Cerium oxides or oxide-forming salts thereof
2235/3231 . . . . Refractory metal oxides, their mixed metal oxides, or oxide-forming salts thereof
2235/3232 . . . . . Titanium oxides or titanates, e.g. rutile or anatase
2235/3234 . . . . . Titanates, not containing zirconia
2235/3236 . . . . . Alkaline earth titanates
2235/3237 . . . . . Substoichiometric titanium oxides, e.g. Ti_2O_3
2235/3239 . . . . . Vanadium oxides, vanadates or oxide forming salts thereof, e.g. magnesium vanadate
2235/3241 . . . . . Chromium oxides, chromates, or oxide-forming salts thereof
2235/3243 . . . . . Chromates or chromites, e.g. aluminum chromate, lanthanum strontium chromite
2235/3244 . . . . . Zirconium oxides, zirconates, hafnium oxides, hafnates, or oxide-forming salts thereof
2235/3246 . . . . . Stabilised zirconias, e.g. YSZ or cerium stabilised zirconia
2235/3248 . . . . . Zirconates or hafnates, e.g. zircon
2235/3249 . . . . . containing also titanium oxide or titanates, e.g. lead zirconate titanate (PZT)
2235/3251 . . . . . Niobium oxides, niobates, tantalum oxides, tantalates, or oxide-forming salts thereof
2235/3253 . . . . . Substoichiometric niobium or tantalum oxides, e.g. NbO
2235/3255 . . . . . Niobates or tantalates, e.g. silver niobate
2235/3256 . . . . . Molybdenum oxides, molybdates or oxide forming salts thereof, e.g. cadmium molybdate
2235/3258 . . . . . Tungsten oxides, tungstates, or oxide-forming salts thereof
2235/326 . . . . . Tungstates, e.g. scheelite
2235/3262 . . . . Manganese oxides, manganates, rhenium oxides or oxide-forming salts thereof, e.g. MnO
2235/3263 . . . . . Mn_3O_4
2235/3265 . . . . . Mn_2O_3
2235/3267 . . . . . MnO_2
2235/3268 . . . . . Manganates, manganites, rhenates or rhenites, e.g. lithium manganite, barium manganate, rhenium oxide
2235/327 . . . . Iron group oxides, their mixed metal oxides, or oxide-forming salts thereof
2235/3272 . . . . . Iron oxides or oxide forming salts thereof, e.g. hematite, magnetite
2235/3274 . . . . . Ferrites
2235/3275 . . . . . Cobalt oxides, cobaltates or cobaltites or oxide forming salts thereof, e.g. bismuth cobaltate, zinc cobaltite
2235/3277 . . . . . Co_3O_4
2235/3279 . . . . . Nickel oxides, nickalates, or oxide-forming salts thereof
2235/3281 . . . . Copper oxides, cuprates or oxide-forming salts thereof, e.g. CuO or Cu_2O
2235/3282 . . . . . Cuprates
2235/3284 . . . . Zinc oxides, zincates, cadmium oxides, cadmiates, mercury oxides, mercurates or oxide forming salts thereof
2235/3286 . . . . Gallium oxides, gallates, indium oxides, indates, thallium oxides, thallates or oxide forming salts thereof, e.g. zinc gallate
2235/3287 . . . . Germanium oxides, germanates or oxide forming salts thereof, e.g. copper germanate
2235/3289 . . . . Noble metal oxides
2235/3291 . . . . . Silver oxides
2235/3293 . . . . Tin oxides, stannates or oxide forming salts thereof, e.g. indium tin oxide [ITO]
2235/3294 . . . . Antimony oxides, antimonates, antimonites or oxide forming salts thereof, indium antimonate
2235/3296 . . . . Lead oxides, plumbates or oxide forming salts thereof, e.g. silver plumbate
2235/3298 . . . . Bismuth oxides, bismuthates or oxide forming salts thereof, e.g. zinc bismuthate
2235/34 . . . Non-metal oxides, non-metal mixed oxides, or salts thereof that form the non-metal oxides upon heating, e.g. carbonates, nitrates, (oxy)hydroxides, chlorides
2235/3409 . . . . Boron oxide, borates, boric acids, or oxide forming salts thereof, e.g. borax
2235/3418 . . . . Silicon oxide, silicic acids, or oxide forming salts thereof, e.g. silica sol, fused silica, silica fume, cristobalite, quartz or flint (glass constituents C04B 2235/36)
2235/3427 . . . . Silicates other than clay, e.g. water glass
2235/3436 . . . . . Alkaline earth metal silicates, e.g. barium silicate
2235/3445 . . . . . Magnesium silicates, e.g. forsterite
2235/3454 . . . . . Calcium silicates, e.g. wollastonite

2235/3463 . . . . . Alumino-silicates other than clay, e.g. mullite
2235/3472 . . . . . Alkali metal alumino-silicates other than clay, e.g. spodumene, alkali feldspars such as albite or orthoclase, micas such as muscovite, zeolites such as natrolite
2235/3481 . . . . . Alkaline earth metal alumino-silicates other than clay, e.g. cordierite, beryl, micas such as margarite, plagioclase feldspars such as anorthite, zeolites such as chabazite
2235/349 . . . . Clays, e.g. bentonites, smectites such as montmorillonite, vermiculites or kaolines, e.g. illite, talc or sepiolite
2235/36 . . . Glass starting materials for making ceramics, e.g. silica glass
2235/365 . . . . Borosilicate glass
2235/38 . . . Non-oxide ceramic constituents or additives
2235/3804 . . . . Borides
2235/3808 . . . . . Magnesium borides
2235/3813 . . . . . Refractory metal borides
2235/3817 . . . . Carbides
2235/3821 . . . . . Boron carbides
2235/3826 . . . . . Silicon carbides
2235/383 . . . . . Alpha silicon carbide
2235/3834 . . . . . Beta silicon carbide
2235/3839 . . . . . Refractory metal carbides
2235/3843 . . . . . Titanium carbides
2235/3847 . . . . . Tungsten carbides
2235/3852 . . . . Nitrides, e.g. oxynitrides, carbonitrides, oxycarbonitrides, lithium nitride, magnesium nitride
2235/3856 . . . . . 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

2235/386 . . . . . Boron nitrides
2235/3865 . . . . . Aluminium nitrides
2235/3869 . . . . . Aluminium oxynitrides, e.g. AlON, sialon
2235/3873 . . . . . Silicon nitrides, e.g. silicon carbonitride, silicon oxynitride
2235/3878 . . . . . Alpha silicon nitrides
2235/3882 . . . . . Beta silicon nitrides
2235/3886 . . . . . Refractory metal nitrides, e.g. vanadium nitride, tungsten nitride
2235/3891 . . . . Silicides, e.g. molybdenum disilicide, iron silicide
2235/3895 . . . . Non-oxides with a defined oxygen content, e.g. SiOC, TiON
2235/40 . . . Metallic constituents or additives not added as binding phase
2235/401 . . . . Alkaline earth metals
2235/402 . . . . Aluminium
2235/404 . . . . Refractory metals
2235/405 . . . . Iron group metals
2235/407 . . . . Copper
2235/408 . . . . Noble metals
2235/42 . . . Non metallic elements added as constituents or additives, e.g. sulfur, phosphor, selenium or tellurium
2235/421 . . . . Boron
2235/422 . . . . Carbon
2235/424 . . . . . Carbon black
2235/425 . . . . . Graphite
2235/427 . . . . . Diamond
2235/428 . . . . Silicon
2235/44 . . . Metal salt constituents or additives chosen for the nature of the anions, e.g. hydrides or acetylacetonate
2235/441 . . . . Alkoxides, e.g. methoxide, tert-butoxide
2235/442 . . . . Carbonates
2235/443 . . . . Nitrates or nitrites
2235/444 . . . . Halide containing anions, e.g. bromide, iodate, chlorite
2235/445 . . . . . Fluoride containing anions, e.g. fluosilicate
2235/446 . . . . Sulfides, tellurides or selenides
2235/447 . . . . Phosphates or phosphites (calcium phosphates C04B 2235/3212), e.g. orthophosphate, hypophosphite
2235/448 . . . . Sulphates or sulphites
2235/449 . . . . Organic acids, e.g. EDTA, citrate, acetate, oxalate
2235/46 . . . Gases other than oxygen used as reactant, e.g. nitrogen used to make a nitride phase
2235/465 . . . . Ammonia
2235/48 . . . Organic compounds becoming part of a ceramic after heat treatment, e.g. carbonising phenol resins
2235/483 . . . . Si-containing organic compounds, e.g. silicone resins, (poly)silanes, (poly)siloxanes or (poly)silazanes
2235/486 . . . . Boron containing organic compounds, e.g. borazine, borane or boranyl
2235/50 . . Constituents or additives of the starting mixture chosen for their shape or used because of their shape or their physical appearance
2235/52 . . . Constituents or additives characterised by their shapes
2235/5204 . . . . Monocrystalline powders
2235/5208 . . . . Fibers
2235/5212 . . . . . Organic
2235/5216 . . . . . Inorganic
2235/522 . . . . . Oxidic
2235/5224 . . . . . Alumina or aluminates
2235/5228 . . . . . Silica and alumina, including aluminosilicates, e.g. mullite
2235/5232 . . . . . Silica or silicates other than aluminosilicates, e.g. quartz
2235/5236 . . . . . Zirconia
2235/524 . . . . . Non-oxidic, e.g. borides, carbides, silicides or nitrides
2235/5244 . . . . . Silicon carbide
2235/5248 . . . . . Carbon, e.g. graphite
2235/5252 . . . . . having a specific pre-form
2235/5256 . . . . . Two-dimensional, e.g. woven structures
2235/526 . . . . . characterised by the length of the fibers
2235/5264 . . . . . characterised by the diameter of the fibers
2235/5268 . . . . . Orientation of the fibers

2235/5272 . . . . . Fibers of the same material with different length or diameter
2235/5276 . . . . Whiskers, spindles, needles or pins
2235/528 . . . . Spheres
2235/5284 . . . . Hollow fibers, e.g. nanotubes
2235/5288 . . . . . Carbon nanotubes
2235/5292 . . . . Flakes, platelets or plates
2235/5296 . . . . with a defined aspect ratio, e.g. indicating sphericity (spherical constituents C04B 2235/528)
2235/54 . . . Particle size related information
2235/5409 . . . . expressed by specific surface values
2235/5418 . . . . expressed by the size of the particles or aggregates thereof
2235/5427 . . . . . millimeter or submillimeter sized, i.e. larger than 0,1 mm
2235/5436 . . . . . micrometer sized, i.e. from 1 to 100 micron
2235/5445 . . . . . submicron sized, i.e. from 0,1 to 1 micron
2235/5454 . . . . . nanometer sized, i.e. below 100 nm
2235/5463 . . . . Particle size distributions
2235/5472 . . . . . Bimodal, multi-modal or multi-fraction
2235/5481 . . . . . Monomodal
2235/549 . . . . the particle size being expressed by crystallite size or primary particle size
2235/60 . Aspects relating to the preparation, properties or mechanical treatment of green bodies or pre-forms
2235/602 . . Making the green bodies or pre-forms by moulding
2235/6021 . . . Extrusion moulding
2235/6022 . . . Injection moulding
2235/6023 . . . Gel casting
2235/6025 . . . Tape casting, e.g. with a doctor blade
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 a solid material, e.g. by using a burying of sacrificial powder
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
2235/70 . 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
2235/763 . . . . . Spinel structure AB_2O_4
2235/764 . . . . . Garnet structure $A_3B_2(CO_4)_3$
2235/765 . . . . Tetragonal symmetry
2235/766 . . . . Trigonal symmetry, e.g. alpha-Si_3N_4 or alpha-Sialon
2235/767 . . . . Hexagonal symmetry, e.g. beta-Si_3N_4, beta-Sialon, alpha-SiC or hexa-ferrites
2235/768 . . . . Perovskite structure ABO_3
2235/77 . . . Density
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 (ABO_3) 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
2235/96 . . 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.

2235/9607 . . . Thermal properties, e.g. thermal expansion coefficient
2235/9615 . . . . Linear firing shrinkage
2235/9623 . . . . Ceramic setters properties
2235/963 . . . Surface properties, e.g. surface roughness
2235/9638 . . . . Tolerance; Dimensional accuracy
2235/9646 . . . Optical properties
2235/9653 . . . . Translucent or transparent ceramics other than alumina
2235/9661 . . . . Colour
2235/9669 . . . Resistance against chemicals, e.g. against molten glass or molten salts
2235/9676 . . . . against molten metals such as steel or aluminium
2235/9684 . . . . Oxidation resistance
2235/9692 . . . . Acid, alkali or halogen resistance

2237/00 Aspects relating to ceramic laminates or to joining of ceramic articles with other articles by heating

2237/02 . Aspects relating to interlayers, e.g. used to join ceramic articles with other articles by heating
2237/04 . . Ceramic interlayers
2237/06 . . . Oxidic interlayers
2237/062 . . . . based on silica or silicates
2237/064 . . . . based on alumina or aluminates
2237/066 . . . . based on rare earth oxides
2237/068 . . . . based on refractory oxides, e.g. zirconia
2237/08 . . . Non-oxidic interlayers
2237/083 . . . . Carbide interlayers, e.g. silicon carbide interlayers
2237/086 . . . . Carbon interlayers
2237/09 . . . wherein the active component for bonding is not the largest fraction of the interlayer
2237/095 . . . . The active component for bonding being silicon
2237/10 . . Glass interlayers, e.g. frit or flux
2237/12 . . Metallic interlayers
2237/121 . . . based on aluminium
2237/122 . . . based on refractory metals
2237/123 . . . based on iron group metals, e.g. steel
2237/124 . . . based on copper
2237/125 . . . based on noble metals, e.g. silver
2237/126 . . . wherein the active component for bonding is not the largest fraction of the interlayer
2237/127 . . . . The active component for bonding being a refractory metal
2237/128 . . . . The active component for bonding being silicon
2237/16 . . Silicon interlayers
2237/30 . Composition of layers of ceramic laminates or of ceramic or metallic articles to be joined by heating, e.g. Si substrates
2237/32 . . Ceramic
2237/34 . . . Oxidic
2237/341 . . . . Silica or silicates
2237/343 . . . . Alumina or aluminates
2237/345 . . . . Refractory metal oxides
2237/346 . . . . . Titania or titanates
2237/348 . . . . . Zirconia, hafnia, zirconates or hafnates
2237/36 . . . Non-oxidic
2237/361 . . . . Boron nitride
2237/363 . . . . Carbon
2237/365 . . . . Silicon carbide
2237/366 . . . . Aluminium nitride
2237/368 . . . . Silicon nitride
2237/38 . . . Fiber or whisker reinforced
2237/385 . . . . Carbon or carbon composite
2237/40 . . Metallic
2237/401 . . . Cermets
2237/402 . . . Aluminium
2237/403 . . . Refractory metals
2237/404 . . . Manganese or rhenium
2237/405 . . . Iron metal group, e.g. Co or Ni
2237/406 . . . . Iron, e.g. steel
2237/407 . . . Copper
2237/408 . . . Noble metals, e.g. palladium, platina or silver
2237/50 . Processing aspects relating to ceramic laminates or to the joining of ceramic articles with other articles by heating
2237/52 . . Pre-treatment of the joining surfaces, e.g. cleaning, machining

2237/525 . . . by heating
2237/54 . . Oxidising the surface before joining
2237/55 . . Pre-treatments of a coated or not coated substrate other than oxidation treatment in order to form an active joining layer
2237/555 . . . on a substrate not containing an interlayer coating, leading to the formation of an interlayer coating
2237/56 . . Using constraining layers before or during sintering
2237/561 . . . Constraining layers not covering the whole surface of the layers to be sintered, e.g. constraining layers with holes
2237/562 . . . made of alumina or aluminates
2237/564 . . . made of glass
2237/565 . . . made of refractory metal oxides, e.g. zirconia
2237/567 . . . made of metal
2237/568 . . . made of non-oxide ceramics
2237/58 . . Forming a gradient in composition or in properties across the laminate or the joined articles
2237/582 . . . by joining layers or articles of the same composition but having different additives
2237/584 . . . . the different additives being fibers or whiskers
2237/586 . . . by joining layers or articles of the same composition but having different densities
2237/588 . . . by joining layers or articles of the same composition but having different particle or grain sizes
2237/59 . . Aspects relating to the structure of the interlayer
2237/592 . . . whereby the interlayer is not continuous, e.g. not the whole surface of the smallest substrate is covered by the interlayer
2237/595 . . . 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
2237/597 . . . whereby the interlayer is continuous but porous, e.g. containing hollow or porous particles, macro- or micropores or cracks
2237/60 . . 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
2237/61 . . 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
2237/62 . . Forming laminates or joined articles comprising holes, channels or other types of openings
2237/64 . . Forming laminates or joined articles comprising grooves or cuts
2237/66 . . Forming laminates or joined articles showing high dimensional accuracy, e.g. indicated by the warpage
2237/68 . . 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
2237/70 . . Forming laminates or joined articles comprising layers of a specific, unusual thickness
2237/702 . . . of one or more of the constraining layers
2237/704 . . . of one or more of the ceramic layers or articles
2237/706 . . . of one or more of the metallic layers or articles
2237/708 . . . of one or more of the interlayers
2237/72 . . Forming laminates or joined articles comprising at least two interlayers directly next to each other
2237/74 . . Forming laminates or joined articles comprising at least two different interlayers separated by a substrate
2237/76 . . 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
2237/765 . . . at least one member being a tube
2237/78 . . Side-way connecting, e.g. connecting two plates through their sides
2237/80 . . Joining the largest surface of one substrate with a smaller surface of the other substrate, e.g. butt joining or forming a T-joint
2237/82 . . Two substrates not completely covering each other, e.g. two plates in a staggered position
2237/84 . . 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
2237/86 . . 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
2237/88 . . 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

2290/00 Organisational aspects of production methods, equipment or plants

2290/10 . Business methods aspects
2290/20 . Integrated combined plants or devices, e.g. combined foundry and concrete plant