CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING
(NOTE omitted)

ENGINES OR PUMPS

F05 INDEXING SCHEMES RELATING TO ENGINES OR PUMPS IN VARIOUS SUBCLASSES OF CLASSES F01-F04

F05D INDEXING SCHEME FOR ASPECTS RELATING TO NON-POSITIVE-DISPLACEMENT MACHINES OR ENGINES, GAS-TURBINES OR JET-PROPULSION PLANTS

2200/00 Mathematical features
2200/10 . Basic functions
2200/11 . . Sum
2200/12 . . Subtraction
2200/13 . . Product
2200/14 . . Division
2200/15 . . Inverse
2200/20 . Special functions
2200/21 . . Root
2200/211 . . . Square root
2200/212 . . . Cubic root
2200/22 . . Power
2200/221 . . . Square power
2200/222 . . . Cubic power
2200/23 . . Logarithm
2200/24 . . exponential
2200/25 . . Hyperbolic trigonometric, e.g. sinh, cosh, tanh
2200/26 . . trigonometric
2200/261 . . . Sine
2200/262 . . . Cosine
2200/263 . . . Tangent
2200/264 . . . Cotangent
2200/30 . miscellaneous
2200/31 . . odd
2200/32 . . even
2200/33 . . bigger or smaller
2200/34 . . biggest or smallest
2200/35 . . first
2200/36 . . last

2210/00 Working fluids
2210/10 . Kind or type
2210/11 . . liquid, i.e. incompressible
2210/12 . . gaseous, i.e. compressible
2210/13 . . mixed, e.g. two-phase fluid
2210/132 . . . Pumps with means for separating and evacuating the gaseous phase
2210/14 . . Refrigerants with particular properties, e.g. HFC
2210/20 . Properties
2210/30 . Flow characteristics
2210/31 . . with Mach-number kept constant along the flow
2210/32 . . Pressure kept constant along the flow
2210/33 . . Turbulent flow
2210/34 . . Laminar flow
2210/40 . Flow geometry or direction
2210/41 . . upwards due to the buoyancy of compressed air
2210/42 . . Axial inlet and radial outlet
2210/43 . . Radial inlet and axial outlet
2210/44 . . bidirectional, i.e. in opposite, alternating directions

2220/00 Application
2220/10 . in ram-jet engines or ram-jet driven vehicles
2220/20 . within closed fluid conduits, e.g. pipes
2220/30 . in turbines
2220/31 . . in steam turbines
2220/32 . . in gas turbines
2220/321 . . . for a special turbine stage
2220/3212 . . . . the first stage of a turbine
2220/3213 . . . . an intermediate stage of the turbine
2220/3215 . . . . the last stage of the turbine
2220/3216 . . . . for a special compressor stage
2220/3217 . . . . . for the first stage of a compressor or a low pressure compressor
2220/3218 . . . . . for an intermediate stage of a compressor
2220/3219 . . . . . for the last stage of a compressor or a high pressure compressor
2220/323 . . . for aircraft propulsion, e.g. jet engines
2220/324 . . . to drive unshrouded, low solidity propeller
2220/325 . . . to drive unshrouded, high solidity propeller
2220/326 . . . to drive shrouded, low solidity propeller
2220/327 . . . to drive shrouded, high solidity propeller
2220/328 . . . providing direct vertical lift
2220/329 . . . in helicopters
2220/34 . . in ram-air turbines ("RATS")
2220/36 . . specially adapted for the fan of turbofan engines
2220/40 . in turbochargers
2220/50 . for auxiliary power units (APU's)
2220/60 . making use of surplus or waste energy
2220/62 . . with energy recovery turbines
2220/64 . . for domestic central heating or production of electricity
2220/70 . in combination with
2220/72 . . a steam turbine
2220/722 . . . as part of an integrated gasification combined cycle
2220/74 . . a gas turbine

2220/75 . . equipment using fuel having a low calorific value, e.g. low BTU fuel, waste end, syngas, biomass fuel or flare gas
2220/76 . . an electrical generator
2220/762 . . . of the direct current (D.C.) type
2220/764 . . . of the alternating current (A.C.) type
2220/7642 . . . . of the synchronous type
2220/7644 . . . . of the asynchronous type, i.e. induction type
2220/7646 . . . . . Double fed induction generators (DFIGs)
2220/766 . . . via a direct connection, i.e. a gearless transmission
2220/768 . . . equipped with permanent magnets
2220/77 . . . of the linear type
2220/80 . in supersonic vehicles excluding hypersonic vehicles or ram, scram or rocket propulsion
2220/90 . in vehicles adapted for vertical or short take off and landing (v/stol vehicles)

2230/00 Manufacture
2230/10 . by removing material
2230/11 . . by electrochemical methods
2230/12 . . by spark erosion methods
2230/13 . . using lasers
2230/14 . . Micromachining
2230/18 . . Manufacturing tolerances
2230/20 . essentially without removing material
2230/21 . . by casting
2230/211 . . . by precision casting, e.g. microfusing or investment casting
2230/22 . . by sintering
2230/23 . . by permanently joining parts together
2230/232 . . . by welding
2230/233 . . . . Electron beam welding
2230/234 . . . . Laser welding
2230/235 . . . . TIG or MIG welding
2230/236 . . . . Diffusion bonding
2230/237 . . . . Brazing
2230/238 . . . . Soldering
2230/239 . . . . Inertia or friction welding
2230/24 . . by extrusion
2230/25 . . by forging
2230/26 . . by rolling
2230/30 . with deposition of material
2230/31 . . Layer deposition
2230/311 . . . by torch or flame spraying
2230/312 . . . by plasma spraying
2230/313 . . . by physical vapour deposition
2230/314 . . . by chemical vapour deposition
2230/40 . Heat treatment
2230/41 . . Hardening; Annealing
2230/411 . . . Precipitation hardening
2230/42 . . by hot isostatic pressing
2230/50 . Building or constructing in particular ways
2230/51 . . in a modular way, e.g. using several identical or complementary parts or features
2230/52 . . using existing or "off the shelf" parts, e.g. using standardized turbocharger elements
2230/53 . . by integrally manufacturing a component, e.g. by milling from a billet or one piece construction
2230/54 . . by sheet metal manufacturing
2230/60 . Assembly methods
2230/61 . . using limited numbers of standard modules which can be adapted by machining
2230/64 . . using positioning or alignment devices for aligning or centring, e.g. pins
2230/642 . . . using maintaining alignment while permitting differential dilatation
2230/644 . . . for adjusting the position or the alignment, e.g. wedges or eccenters
2230/68 . . using auxiliary equipment for lifting or holding
2230/70 . Disassembly methods
2230/72 . Maintenance
2230/80 . Repairing, retrofitting or upgrading methods
2230/90 . Coating; Surface treatment (manufacture with deposition of material F05D 2230/30)

2240/00 Components

NOTE

Components are the basic elements of construction

2240/10 . Stators
2240/11 . . Shroud seal segments
2240/12 . . Fluid guiding means, e.g. vanes
2240/121 . . . related to the leading edge of a stator vane
2240/122 . . . related to the trailing edge of a stator vane
2240/123 . . . related to the pressure side of a stator vane
2240/124 . . . related to the suction side of a stator vane
2240/125 . . . related to the tip of a stator vane
2240/126 . . . Baffles or ribs
2240/127 . . . Vortex generators, turbulators, or the like, for mixing (by creating turbulence F05D 2260/2212)
2240/128 . . . Nozzles
2240/1281 . . . . Plug nozzles
2240/129 . . . Cascades, i.e. assemblies of similar profiles acting in parallel
2240/14 . . Casings or housings protecting or supporting assemblies within
2240/15 . . Heat shield
2240/20 . Rotors
2240/24 . . for turbines
2240/241 . . . of impulse type
2240/242 . . . of reaction type
2240/243 . . . of the Archimedes screw type
2240/30 . . Characteristics of rotor blades, i.e. of any element transforming dynamic fluid energy to or from rotational energy and being attached to a rotor
2240/301 . . . Cross-sectional characteristics
2240/302 . . . characteristics related to shock waves, transonic or supersonic flow
2240/303 . . . related to the leading edge of a rotor blade
2240/304 . . . related to the trailing edge of a rotor blade
2240/305 . . . related to the pressure side of a rotor blade
2240/306 . . . related to the suction side of a rotor blade
2240/307 . . . related to the tip of a rotor blade
2240/31 . . . with roughened surfaces
2240/35 . Combustors or associated equipment
2240/36 . . Fuel vaporizer
2240/40 . Use of a multiplicity of similar components
2240/50 . Bearings
2240/51 . . Magnetic
2240/511 . . . with permanent magnets
2240/515 . . . Electromagnetic
2240/52 . . Axial thrust bearings
2240/53 . . Hydrodynamic or hydrostatic bearings

2240/54 . . Radial bearings
2240/55 . Seals
2240/56 . . Brush seals
2240/57 . . Leaf seals
2240/58 . . Piston ring seals
2240/581 . . . Double or plural piston ring arrangements, i.e. two or more piston rings
2240/59 . . Lamellar seals
2240/60 . Shafts
2240/61 . . Hollow
2240/62 . . Flexible
2240/63 . . Glands for admission or removal of fluids from shafts
2240/70 . Slinger plates or washers
2240/80 . Platforms for stationary or moving blades
2240/81 . . Cooled platforms
2240/90 . Mounting on supporting structures or systems
2240/91 . . on a stationary structure

2250/00 Geometry

NOTE

Geometry indicates the shape or form of a component or the configuration or arrangement of components in a machine or in a plant

2250/10 . Two-dimensional
2250/11 . . triangular
2250/12 . . rectangular
2250/121 . . . square
2250/13 . . trapezoidal
2250/131 . . . polygonal
2250/132 . . . hexagonal
2250/14 . . elliptical
2250/141 . . . circular
2250/15 . . spiral
2250/16 . . parabolic
2250/17 . . hyperbolic
2250/18 . . patterned
2250/181 . . . ridged
2250/182 . . . crenellated, notched
2250/183 . . . zigzag
2250/184 . . . sinusoidal
2250/185 . . . serpentine-like
2250/19 . . machined; miscellaneous
2250/191 . . . perforated
2250/192 . . . bevelled
2250/193 . . . milled
2250/20 . Three-dimensional
2250/21 . . pyramidal
2250/22 . . parallelepipedal
2250/221 . . . cubic
2250/23 . . prismatic
2250/231 . . . cylindrical
2250/232 . . . conical
2250/24 . . ellipsoidal
2250/241 . . . spherical
2250/25 . . helical
2250/26 . . paraboloid
2250/27 . . hyperboloid
2250/28 . . patterned
2250/281 . . . threaded
2250/282 . . . cubic pattern
2250/283 . . . honeycomb
2250/29 . . machined; miscellaneous
2250/291 . . . hollowed
2250/292 . . . tapered
2250/293 . . . lathed, e.g. rotation symmetrical
2250/294 . . . grooved
2250/30 . Arrangement of components
2250/31 . . according to the direction of their main axis or their axis of rotation
2250/311 . . . the axes being in line
2250/312 . . . the axes being parallel to each other
2250/313 . . . the axes being perpendicular to each other
2250/314 . . . the axes being inclined in relation to each other
2250/315 . . . the main axis being substantially vertical
2250/32 . . according to their shape
2250/321 . . . asymptotic
2250/322 . . . tangential
2250/323 . . . convergent
2250/324 . . . divergent
2250/33 . . symmetrical
2250/34 . . translated
2250/35 . . rotated
2250/36 . . in inner-outer relationship, e.g. shaft-bearing arrangements
2250/37 . . circumferential
2250/38 . . angled, e.g. sweep angle
2250/40 . Movement of components
2250/41 . . with one degree of freedom
2250/411 . . . in rotation
2250/42 . . with two degrees of freedom
2250/43 . . with three degrees of freedom
2250/44 . . by counter rotation
2250/50 . Inlet or outlet
2250/51 . . Inlet
2250/511 . . . augmenting, i.e. with intercepting fluid flow cross sectional area greater than the rest of the machine behind the inlet
2250/512 . . . concentrating only, i.e. with intercepting fluid flow cross sectional area not greater than the rest of the machine behind the inlet
2250/52 . . Outlet
2250/53 . . of regenerative pumps
2250/60 . Structure; Surface texture
2250/61 . . corrugated
2250/611 . . . undulated
2250/62 . . smooth or fine
2250/621 . . . polished
2250/63 . . coarse
2250/70 . Shape
2250/71 . . curved
2250/711 . . . convex
2250/712 . . . concave
2250/713 . . . inflexed
2250/72 . . symmetric
2250/73 . . asymmetric
2250/74 . . given by a set or table of xyz-coordinates
2250/75 . . given by its similarity to a letter, e.g. T-shaped
2250/80 . Size or power range of the machines
2250/82 . . Micromachines
2250/84 . . Nanomachines
2250/90 . Variable geometry

2260/00 Function

2260/02 . Transport and handling during maintenance and repair
2260/10 . Particular cycles
2260/12 . Testing on a test bench
2260/14 . Preswirling
2260/15 . Load balancing
2260/16 . Fluid modulation at a certain frequency
2260/20 . Heat transfer, e.g. cooling
2260/201 . . by impingement of a fluid
2260/202 . . by film cooling
2260/203 . . by transpiration cooling
2260/204 . . by the use of microcircuits
2260/205 . . Cooling fluid recirculation, i.e. after cooling one or more components is the cooling fluid recovered and used elsewhere for other purposes
2260/207 . . using a phase changing mass, e.g. heat absorbing by melting or boiling
2260/208 . . using heat pipes
2260/209 . . using vortex tubes
2260/211 . . by intercooling, e.g. during a compression cycle
2260/212 . . by water injection
2260/213 . . by the provision of a heat exchanger within the cooling circuit
2260/221 . . Improvement of heat transfer
2260/2212 . . . by creating turbulence (vortex generators, turbulators or the like for mixing F05D 2240/127)
2260/2214 . . . by increasing the heat transfer surface
2260/22141 . . . . using fins or ribs
2260/231 . . Preventing heat transfer
2260/232 . . characterized by the cooling medium
2260/2322 . . . steam
2260/234 . . of the generator by compressor inlet air
2260/24 . . for draft enhancement in chimneys, using solar or other heat sources
2260/30 . Retaining components in desired mutual position
2260/31 . . Retaining bolts or nuts
2260/311 . . . of the frangible or shear type
2260/32 . . by means of magnetic or electromagnetic forces
2260/33 . . with a bayonet coupling
2260/34 . . Balancing of radial or axial forces on regenerative rotors
2260/35 . . Reducing friction between regenerative impeller discs and casing walls
2260/36 . . by a form fit connection, e.g. by interlocking
2260/37 . . by a press fit connection
2260/38 . . by a spring, i.e. spring loaded or biased towards a certain position
2260/39 . . by a V-shaped ring to join the flanges of two cylindrical sections, e.g. casing sections of a turbocharger
2260/40 . Transmission of power
2260/402 . . through friction drives
2260/4021 . . . through belt drives
2260/4022 . . . through endless chains
2260/4023 . . . through a friction clutch
2260/403 . . through the shape of the drive components
2260/4031 . . . as in toothed gearing
2260/40311 . . . . of the epicyclical, planetary or differential type
2260/404 . . through magnetic drive coupling
2260/4041 . . . the driven magnets encircling the driver magnets
2260/406 . . through hydraulic systems
2260/407 . . through piezoelectric conversion
2260/408 . . through magnetohydrodynamic conversion
2260/42 . Storage of energy
2260/43 . . in the form of rotational kinetic energy, e.g. in flywheels
2260/50 . Kinematic linkage, i.e. transmission of position
2260/52 . . involving springs
2260/53 . . using gears
2260/532 . . . of the bevelled or angled type
2260/54 . . using flat or V-belts and pulleys
2260/55 . . using chains and sprockets; using toothed belts
2260/56 . . using cams or eccentrics
2260/57 . . using servos, independent actuators, etc.
2260/60 . Fluid transfer
2260/601 . . using an ejector or a jet pump
2260/602 . . Drainage
2260/6022 . . . of leakage having past a seal (seals F05D 2240/57; glands F05D 2240/63)
2260/604 . . Vortex non-clogging type pumps
2260/605 . . Venting into the ambient atmosphere or the like
2260/606 . . Bypassing the fluid
2260/607 . . Preventing clogging or obstruction of flow paths by dirt, dust, or foreign particles
2260/608 . . Aeration, ventilation, dehumidification or moisture removal of closed spaces
2260/609 . . Deoiling or demisting
2260/61 . . Removal of CO_2 (removal of CO_2 from waste gases B01D 53/62)
2260/611 . . Sequestration of CO_2
2260/70 . Adjusting of angle of incidence or attack of rotating blades
2260/71 . . as a function of flow velocity
2260/72 . . by turning around an axis parallel to the rotor centre line
2260/74 . . by turning around an axis perpendicular the rotor centre line
2260/75 . . the adjusting mechanism not using auxiliary power sources, e.g. by "servos"
2260/76 . . the adjusting mechanism using auxiliary power sources
2260/77 . . the adjusting mechanism driven or triggered by centrifugal forces
2260/78 . . the adjusting mechanism driven or triggered by aerodynamic forces
2260/79 . . Bearing, support or actuation arrangements therefor
2260/80 . Diagnostics
2260/81 . Modelling or simulation
2260/82 . Forecasts
2260/821 . . Parameter estimation or prediction
2260/83 . Testing, e.g. methods, components or tools therefor
2260/84 . Redundancy
2260/85 . Starting
2260/90 . Braking
2260/901 . . using aerodynamic forces, i.e. lift or drag
2260/902 . . using frictional mechanical forces
2260/903 . . using electrical or magnetic forces
2260/904 . . using hydrodynamic forces

2260/94 . Functionality given by mechanical stress related aspects such as low cycle fatigue [LCF] of high cycle fatigue [HCF]
2260/941 . . particularly aimed at mechanical or thermal stress reduction
2260/95 . Preventing corrosion (coating or surface treatment F05D 2230/90)
2260/96 . Preventing, counteracting or reducing vibration or noise
2260/961 . . by mistuning rotor blades or stator vanes with irregular interblade spacing, airfoil shape
2260/962 . . by means of "anti-noise"
2260/963 . . by Helmholtz resonators
2260/964 . . counteracting thermoacoustic noise
2260/97 . Reducing windage losses
2260/972 . . in radial flow machines
2260/98 . Lubrication
2260/99 . Ignition, e.g. ignition by warming up of fuel or oxidizer in a resonant acoustic cavity

2270/00 Control
2270/01 . Purpose of the control system
2270/02 . . to control rotational speed (n)
2270/021 . . . to prevent overspeed
2270/022 . . . to prevent underspeed
2270/023 . . . of different spools or shafts
2270/024 . . . to keep rotational speed constant
2270/03 . . in variable speed operation
2270/04 . . to control acceleration (u)
2270/042 . . . by keeping it below damagingly high values
2270/044 . . . by making it as high as possible
2270/05 . . to affect the output of the engine
2270/051 . . . Thrust
2270/052 . . . Torque
2270/053 . . . Explicitly mentioned power
2270/06 . . to match engine to driven device
2270/061 . . . in particular the electrical frequency of driven generator
2270/07 . . to improve fuel economy
2270/071 . . . in particular at idling speed
2270/08 . . to produce clean exhaust gases
2270/081 . . . with as little smoke as possible
2270/082 . . . with as little NOx as possible
2270/083 . . . by monitoring combustion conditions
2270/0831 . . . . indirectly, at the exhaust
2270/09 . . to cope with emergencies
2270/091 . . . in particular sudden load loss
2270/092 . . . in particular blow-out and relight
2270/093 . . . of one engine in a multi-engine system
2270/094 . . . by using back-up controls
2270/095 . . . by temporary overriding set control limits
2270/096 . . . caused by water or hail ingestion
2270/10 . . to cope with, or avoid, compressor flow instabilities
2270/101 . . . Compressor surge or stall
2270/102 . . . . caused by working fluid flow velocity profile distortion
2270/1022 . . . . . due to high angle of attack of aircraft
2270/1024 . . . . . due to compressor degradation
2270/11 . . to prolong engine life
2270/112 . . . by limiting temperatures
2270/114 . . . by limiting mechanical stresses
2270/116 . . . by preventing reverse rotation
2270/12 . . to maintain desired vehicle trajectory parameters
2270/121 . . . Altitude
2270/122 . . . Speed or Mach number
2270/13 . . to control two or more engines simultaneously
2270/14 . . to control thermoacoustic behaviour in the combustion chambers (counteracting noise or vibration F05D 2260/96)
2270/16 . . to control water or steam injection
2270/17 . . to control boundary layer
2270/172 . . . by a plasma generator, e.g. control of ignition
2270/173 . . . by the Coanda effect
2270/18 . . using fluidic amplifiers or actuators
2270/20 . . to optimize the performance of a machine
2270/30 . Control parameters, e.g. input parameters
2270/301 . . Pressure
2270/3011 . . . Inlet pressure
2270/3013 . . . Outlet pressure
2270/3015 . . . differential pressure
2270/303 . . Temperature
2270/3032 . . . excessive temperatures, e.g. caused by overheating
2270/304 . . Spool rotational speed
2270/305 . . Tolerances
2270/306 . . Mass flow
2270/3061 . . . of the working fluid
2270/3062 . . . of the auxiliary fluid for heating or cooling purposes
2270/309 . . Rate of change of parameters
2270/31 . . Fuel schedule for stage combustors
2270/311 . . Air humidity
2270/312 . . Air pressure
2270/313 . . Air temperature
2270/331 . . Mechanical loads
2270/332 . . Maximum loads or fatigue criteria
2270/333 . . Noise or sound levels
2270/334 . . Vibration measurements
2270/335 . . Output power or torque
2270/336 . . Blade lift measurements
2270/40 . Type of control system
2270/42 . . passive or reactive, e.g. using large wind vanes
2270/44 . . active, predictive, or anticipative
2270/46 . . redundant, i.e. failsafe operation
2270/50 . Control logic embodiments
2270/52 . . by electrical means, e.g. relays or switches
2270/54 . . by electronic means, e.g. electronic tubes, transistors or IC's within an electronic circuit
2270/56 . . by hydraulic means, e.g. hydraulic valves within a hydraulic circuit
2270/58 . . by mechanical means, e.g. levers, gears or cams
2270/60 . Control system actuates means
2270/62 . . Electrical actuators
2270/64 . . Hydraulic actuators
2270/65 . . Pneumatic actuators
2270/66 . . Mechanical actuators (F05D 2270/62 takes precedence)
2270/70 . Type of control algorithm
2270/701 . . proportional
2270/702 . . differential
2270/703 . . integral
2270/704 . . proportional-differential
2270/705 . . proportional-integral
2270/706 . . proportional-integral-differential

2270/707 . . fuzzy logic
2270/708 . . with comparison tables
2270/709 . . with neural networks
2270/71 . . synthesized, i.e. parameter computed by a mathematical model
2270/80 . Devices generating input signals, e.g. transducers, sensors, cameras or strain gauges
2270/802 . . Calibration thereof
2270/803 . . Sampling thereof
2270/804 . . Optical devices
2270/8041 . . . Cameras
2270/805 . . Radars
2270/806 . . Sonars
2270/807 . . Accelerometers
2270/808 . . Strain gauges; Load cells
2270/809 . . Encoders
2270/81 . . Microphones
2270/821 . . Displacement measuring means, e.g. inductive

2300/00 Materials; Properties thereof
2300/10 . Metals, alloys or intermetallic compounds
2300/11 . . Iron
2300/111 . . . Cast iron
2300/12 . . Light metals
2300/121 . . . Aluminium
2300/122 . . . Beryllium
2300/123 . . . Boron
2300/124 . . . Lithium
2300/125 . . . Magnesium
2300/13 . . Refractory metals, i.e. Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, W
2300/131 . . . Molybdenum
2300/132 . . . Chromium
2300/133 . . . Titanium
2300/134 . . . Zirconium
2300/135 . . . Hafnium
2300/14 . . Noble metals, i.e. Ag, Au, platinum group metals
2300/141 . . . Silver
2300/142 . . . Gold
2300/143 . . . Platinum group metals, i.e. Os, Ir, Pt, Ru, Rh, Pd
2300/1431 . . . . Palladium
2300/1432 . . . . Ruthenium
2300/1433 . . . . Osmium
2300/1434 . . . . Iridium
2300/1435 . . . . Rhodium
2300/15 . . Rare earth metals, i.e. Sc, Y, lanthanides
2300/16 . . Other metals not provided for in groups F05D 2300/11 - F05D 2300/15
2300/1602 . . . Arsenic
2300/1604 . . . Antimony
2300/1606 . . . Bismuth
2300/1608 . . . Barium
2300/161 . . . Manganese
2300/1612 . . . Lead
2300/1614 . . . Tin
2300/1616 . . . Zinc
2300/1618 . . . Mercury
2300/17 . . Alloys
2300/171 . . . Steel alloys
2300/172 . . . Copper alloys
2300/1721 . . . . Bronze
2300/1722 . . . . Phosphor-bronze alloy
2300/1723 . . . . Nickel-Copper alloy, e.g. Monel
2300/173 . . . Aluminium alloys, e.g. AlCuMgPb
2300/174 . . . Titanium alloys, e.g. TiAl
2300/175 . . . Superalloys
2300/176 . . . Heat-stable alloys
2300/177 . . . Ni - Si alloys
2300/18 . . Intermetallic compounds
2300/182 . . . Metal-aluminide intermetallic compounds
2300/20 . Oxide or non-oxide ceramics
2300/21 . . Oxide ceramics
2300/2102 . . . Glass
2300/2104 . . . MIBA
2300/2106 . . . Quartz
2300/2108 . . . Phosphor
2300/211 . . . Silica
2300/2112 . . . Aluminium oxides
2300/2114 . . . Sapphire
2300/2116 . . . Zinc oxide
2300/2118 . . . Zirconium oxides
2300/212 . . . Aluminium titanate
2300/22 . . Non-oxide ceramics
2300/222 . . . Silicon
2300/224 . . . Carbon, e.g. graphite
2300/226 . . . Carbides
2300/2261 . . . . of silicon
2300/2262 . . . . of titanium, e.g. TiC
2300/2263 . . . . of tungsten, e.g. WC
2300/228 . . . Nitrides
2300/2281 . . . . of aluminium
2300/2282 . . . . of boron
2300/2283 . . . . of silicon
2300/2284 . . . . of titanium
2300/2285 . . . . of zirconium
2300/229 . . . Sulfides
2300/2291 . . . . of molybdenum
2300/30 . Inorganic materials other than provided for in groups F05D 2300/10 - F05D 2300/2291
2300/40 . Organic materials
2300/41 . . Leather
2300/42 . . Cellulosic materials, e.g. wood
2300/43 . . Synthetic polymers, e.g. plastics; Rubber
2300/431 . . . Rubber
2300/432 . . . PTFE [PolyTetraFluorEthylene]
2300/433 . . . Polyamides, e.g. NYLON
2300/434 . . . Polyimides, e.g. AURUM
2300/436 . . . Polyetherketones, e.g. PEEK
2300/437 . . . Silicon polymers
2300/44 . . Resins
2300/48 . . other organic materials
2300/50 . Intrinsic material properties or characteristics
2300/501 . . Elasticity
2300/502 . . Thermal properties
2300/5021 . . . Expansivity
2300/50211 . . . . similar
2300/50212 . . . . dissimilar
2300/5023 . . . Thermal capacity
2300/5024 . . . Heat conductivity
2300/504 . . Reflective properties
2300/505 . . Shape memory behaviour
2300/506 . . Hardness

2300/507	. . Magnetic properties
2300/509	. . Self lubricating materials; Solid lubricants
2300/51	. . Hydrophilic, i.e. being or having wettable properties
2300/512	. . Hydrophobic, i.e. being or having non-wettable properties
2300/514	. . Porosity
2300/516	. . Surface roughness
2300/518	. . Ductility
2300/52	. . Translucence
2300/522	. . Density
2300/60	. Properties or characteristics given to material by treatment or manufacturing
2300/601	. . Fabrics
2300/6012	. . . Woven fabrics
2300/603	. . Composites; e.g. fibre-reinforced
2300/6031	. . . Functionally graded composites
2300/6032	. . . Metal matrix composites [MMC]
2300/6033	. . . Ceramic matrix composites [CMC]
2300/6034	. . . Orientation of fibres, weaving, ply angle
2300/604	. . Amorphous
2300/605	. . Crystalline
2300/606	. . Directionally-solidified crystalline structures
2300/607	. . Monocrystallinity
2300/608	. . Microstructure
2300/609	. . Grain size
2300/61	. . Syntactic materials, i.e. hollow spheres embedded in a matrix
2300/611	. . Coating
2300/6111	. . functionally graded coating
2300/612	. . Foam
2300/613	. . Felt
2300/614	. . Fibres or filaments
2300/615	. . Filler
2300/70	. Treatment or modification of materials
2300/701	. . Heat treatment
2300/702	. . Reinforcement