

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](#)

F05B INDEXING SCHEME RELATING TO MACHINES OR ENGINES OTHER THAN NON-POSITIVE-DISPLACEMENT MACHINES OR ENGINES, TO WIND MOTORS, TO NON-POSITIVE DISPLACEMENT PUMPS, AND TO GENERATING COMBUSTION PRODUCTS OF HIGH PRESSURE OR HIGH VELOCITY

NOTE

This subclass constitutes an internal scheme for indexing only.

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/smaller
- 2200/34 . . biggest/smallest
- 2200/35 . . first
- 2200/36 . . last

2210/00 Working fluid

NOTE

Indexing codes of group [F05B 2210/00](#) can be followed by a name for a specific working fluid preceded by the "+" sign, e.g. [F05B 2210/11 +water](#).

- 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-134a
- 2210/16 . Air or water being indistinctly used as working fluid, i.e. the machine can work equally with air or water without any modification
- 2210/18 . Air and water being simultaneously used as working fluid
- 2210/20 . Properties
- 2210/30 . Flow characteristics
- 2210/301 . . with Mach-number kept constant along the flow
- 2210/302 . . Pressure kept constant along the flow
- 2210/40 . Flow geometry or direction
- 2210/401 . . upwards due to the buoyancy of compressed air
- 2210/402 . . Axial inlet and radial outlet
- 2210/403 . . Radial inlet and axial outlet
- 2210/404 . . 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
- 2220/25 . as advertisement
- 2220/30 . in turbines
- 2220/301 . . in steam turbines
- 2220/302 . . in gas turbines
- 2220/3021 . . . for a special turbine stage
- 2220/3022 the first stage of a turbine
- 2220/3023 an intermediate stage of the turbine
- 2220/3025 the last stage of the turbine
- 2220/303 . . . for aircraft propulsion, e.g. jet engines
- 2220/304 . . . to drive unshrouded, low solidity propeller
- 2220/305 . . . to drive unshrouded, high solidity propeller
- 2220/306 . . . to drive shrouded, low solidity propeller
- 2220/307 . . . to drive shrouded, high solidity propeller
- 2220/308 . . . providing direct vertical lift
- 2220/309 . . . in a helicopter
- 2220/31 . . in ram-air turbines ("RATS")
- 2220/32 . . in water turbines

- 2220/33 . . 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
 - 2220/602 . . with energy recovery turbines
 - 2220/604 . . for domestic central heating or production of electricity
 - 2220/61 . for hydrogen and/or oxygen production
 - 2220/62 . for desalination
 - 2220/64 . for aeration
 - 2220/70 . in combination with
 - 2220/702 . . a steam turbine
 - 2220/704 . . a gas turbine
 - 2220/706 . . an electrical generator
 - 2220/7062 . . . of the direct current (D.C.) type
 - 2220/7064 . . . of the alternating current (A.C.) type
 - 2220/70642 of the synchronous type
 - 2220/70644 of the asynchronous type, i.e. induction type
 - 2220/70646 Double fed induction generators (DFIGs)
 - 2220/7066 . . . via a direct connection, i.e. a gearless transmission
 - 2220/7068 . . . equipped with permanent magnets
 - 2220/707 . . . of the linear type
 - 2220/708 . . Photoelectric means, i.e. photovoltaic or solar cells
 - 2220/709 . . Piezoelectric means
 - 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), ([gas turbines providing direct vertical lift F05B 2220/308](#))
- 2230/00 Manufacture**
- NOTE**
Manufacture comprises also treatment, assembly or disassembly methods, repairing, handling or the like.
- 2230/10 . by removing material
 - 2230/101 . . by electrochemical methods
 - 2230/102 . . by spark erosion methods
 - 2230/103 . . using lasers
 - 2230/104 . Micromachining
 - 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/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 spray
 - 2230/312 . . . by plasma spray
 - 2230/313 . . . by physical vapour deposition
 - 2230/314 . . . by chemical vapour deposition
 - 2230/40 . Heat treatment
 - 2230/41 . . Hardening; Annealing
 - 2230/50 . Building or constructing in particular ways
 - 2230/502 . . using existing or "off the shelf" parts, e.g. using standardised turbocharger elements
 - 2230/60 . Assembly methods
 - 2230/601 . . using limited numbers of standard modules which can be adapted by machining
 - 2230/604 . . using positioning or alignment devices for aligning or centering, e.g. pins
 - 2230/606 . . . using maintaining alignment while permitting differential dilatation
 - 2230/608 . . . for adjusting the position or the alignment, e.g. wedges or excenters
 - 2230/61 . . using auxiliary equipment for lifting or holding ([hoisting on to a stationary structure with provisions on the structure itself F05B 2240/916](#))
 - 2230/6102 . . . carried on a floating platform
 - 2230/70 . Disassembly methods
 - 2230/80 . Repairing, retrofitting or upgrading methods
 - 2230/90 . Coating; Surface treatment ([manufacture with deposition of material F05B 2220/30](#))
- 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 . . . Baffles or ribs
 - 2240/122 . . . Vortex generators, turbulators, or the like, for mixing ([by creating turbulence F05B 2260/222](#))
 - 2240/123 . . . Nozzles
 - 2240/1231 Plug nozzles
 - 2240/124 . . . Cascades, i.e. assemblies of similar profiles acting in parallel
 - 2240/13 . . to collect or cause flow towards or away from turbines
 - 2240/131 . . . by means of vertical structures, i.e. chimneys
 - 2240/132 . . . creating a vortex or tornado effect
 - 2240/133 . . . with a convergent-divergent guiding structure, e.g. a Venturi conduit
 - 2240/14 . . Casings, housings, nacelles, gondels or the like, protecting or supporting assemblies within
 - 2240/142 . . . in the form of a standard ISO container
 - 2240/20 . Rotors
 - 2240/201 . . using the Magnus-effect
 - 2240/202 . . with adjustable area of intercepted fluid
 - 2240/2021 . . . by means of telescoping blades
 - 2240/2022 . . . by means of tethering or coning blades
 - 2240/2023 . . . by means of radially reefing blades
 - 2240/21 . . for wind turbines
 - 2240/211 . . . with vertical axis
 - 2240/212 of the Darrieus type
 - 2240/213 of the Savonius type
 - 2240/214 of the Musgrove or "H"-type
 - 2240/215 of the panemone or "vehicle ventilator" type

F05B

- 2240/216 of the anemometer type
- 2240/217 of the crossflow- or "Banki"- or "double action" type
- 2240/218 with horizontally hinged vanes
- 2240/221 with horizontal axis
- 2240/2211 of the multibladed, low speed, e.g. "American farm" type
- 2240/2212 perpendicular to wind direction
- 2240/2213 and with the rotor downwind from the yaw pivot axis
- 2240/231 driven by aerodynamic lift effects
- 2240/232 driven by drag
- 2240/24 for turbines
- 2240/241 of impulse type
- 2240/2411 Pelton type
- 2240/242 of reaction type
- 2240/243 of the Archimedes screw type
- 2240/244 of the cross-flow, e.g. Banki, Ossberger 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-section characteristics
- 2240/302 Segmented or sectional blades
- 2240/31 of changeable form or shape
- 2240/311 flexible or elastic
- 2240/312 capable of being reefed
- 2240/3121 around an axis orthogonal to rotor rotational axis
- 2240/313 with adjustable flow intercepting area (F05B 2240/312 takes precedence)
- 2240/32 with roughened surfaces
- 2240/33 Shrouds which are part of or which are rotating with the rotor
- 2240/34 with auxiliary or secondary rotors attached to blades of main rotor
- 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
- 2240/57 Seals
- 2240/571 Brush seals
- 2240/572 Leaf 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
- 2240/801 cooled platforms
- 2240/90 Mounting on supporting structures or systems
- 2240/91 on a stationary structure
- 2240/911 already existing for a prior purpose
- 2240/9111 which is a chimney
- 2240/9112 which is a building
- 2240/9113 which is a roadway, rail track, or the like for recovering energy from moving vehicles
- 2240/912 on a tower
- 2240/9121 on a lattice tower
- 2240/913 on a mast
- 2240/914 on an inflatable structure
- 2240/915 which is vertically adjustable
- 2240/9151 telescopically
- 2240/9152 by being hinged
- 2240/91521 at ground level
- 2240/916 with provision for hoisting onto the structure
- 2240/917 attached to cables
- 2240/92 on an airborne structure
- 2240/921 kept aloft due to aerodynamic effects
- 2240/922 kept aloft due to buoyancy effects
- 2240/923 which is a vehicle
- 2240/93 on a structure floating on a liquid surface
- 2240/931 which is a vehicle
- 2240/932 which is a catamaran-like structure
- 2240/94 on a movable wheeled structure
- 2240/941 which is a land vehicle
- 2240/95 offshore
- 2240/96 as part of a wind farm
- 2240/97 on a submerged structure
- 2240/98 which is inflatable
- 2240/99 characterised by colour or colour patterns
- 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.
- 2250/02 variable
- 2250/10 two-dimensional
- 2250/11 triangular
- 2250/12 rectangular
- 2250/121 square
- 2250/13 trapezial
- 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
- 2250/19 machined; miscellaneous
- 2250/191 perforated
- 2250/192 beveled
- 2250/193 milled
- 2250/20 three-dimensional
- 2250/21 pyramidal
- 2250/22 parallelepipedic
- 2250/221 cubic
- 2250/23 prismatic
- 2250/231 cylindrical
- 2250/232 conical

- 2250/24 . . ellipsoidal
- 2250/241 . . . spherical
- 2250/25 . . helical
- 2250/26 . . paraboloidal
- 2250/27 . . hyperboloidal
- 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
- 2250/30 . 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
- 2250/40 . Movement of component
- 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
- 2250/50 . Inlet or outlet
- 2250/501 . . Inlet
 - 2250/5011 . . . augmenting, i.e. with intercepting fluid flow cross sectional area greater than the rest of the machine behind the inlet
 - 2250/5012 . . . concentrating only, i.e. with intercepting fluid flow cross sectional area not greater than the rest of the machine behind the inlet
- 2250/502 . . Outlet
- 2250/503 . . of regenerative pumps
- 2250/60 . Structure; Surface texture
- 2250/61 . . corrugated
 - 2250/611 . . . undulated
- 2250/62 . . smooth
 - 2250/621 . . . polished
- 2250/70 . Shape
 - 2250/71 . . curved
 - 2250/711 . . . convex
 - 2250/712 . . . concave
 - 2250/713 . . . inflexed
 - 2250/72 . . symmetric
 - 2250/73 . . asymmetric
- 2250/80 . Size or power range of the machines
- 2250/82 . . Micromachines
- 2250/84 . . Nanomachines ([Nanotechnology for interacting, sensing or actuating B82Y 15/00](#))
- 2250/86 . . Megamachines
- 2260/00 Function**
- 2260/02 . Transport, e.g. specific adaptations or devices for conveyance ([transport of wind turbines or equipments therefore F03D 13/40](#))
- 2260/10 . Particular cycles
- 2260/20 . Heat transfer, e.g. cooling
 - 2260/201 . . by impingement of a fluid
 - 2260/202 . . by film cooling
 - 2260/203 . . by transpiration cooling
 - 2260/205 . . Cooling fluid recirculation, i.e. after having cooled one or more components the cooling fluid is 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
- 2260/221 . . Improvement of heat transfer
 - 2260/222 . . . by creating turbulence ([vortex generators, turbulators or the like for mixing F05B 2240/122](#))
 - 2260/224 . . . by increasing the heat transfer surface
- 2260/2241 using fins or ribs
- 2260/231 . . Preventing heat transfer
- 2260/232 . . characterised by the cooling medium
 - 2260/233 . . . the medium being steam
- 2260/24 . . for draft enhancement in chimneys, using solar or other heat sources
- 2260/30 . Retaining components in desired mutual position
 - 2260/301 . . Retaining bolts or nuts
 - 2260/3011 . . . of the frangible or shear type
 - 2260/302 . . by means of magnetic or electromagnetic forces
 - 2260/303 . . with a bayonet coupling
 - 2260/304 . . Balancing of radial or axial forces on regenerative rotors
- 2260/305 . . Reducing friction between regenerative impeller discs and casing walls
- 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 epicyclic, 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
 - 2260/421 . . in the form of rotational kinetic energy, e.g. in flywheels
- 2260/50 . Kinematic linkage, i.e. transmission of position
 - 2260/502 . . involving springs
 - 2260/503 . . using gears
 - 2260/5032 . . . of the bevel or angled type
 - 2260/504 . . using flat or V-belts and pulleys

- 2260/505 . . using chains and sprockets; using toothed belts
 - 2260/506 . . using cams or eccentrics
 - 2260/507 . . using servos, independent actuators, etc.
 - 2260/60 . Fluid transfer
 - 2260/601 . . using an ejector or a jet pump
 - 2260/602 . . Drainage
 - 2260/603 . . . of leakage having past a seal ([seals F05B 2240/57](#); [glands F05B 2240/63](#))
 - 2260/604 . . Vortex non-clogging type pumps
 - 2260/63 . . Preventing clogging or obstruction of flow paths by dirt, dust, or foreign particles
 - 2260/64 . . Aeration, ventilation, dehumidification or moisture removal of closed spaces
 - 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 ("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
 - 2260/82 . Forecasts
 - 2260/821 . . Parameter estimation or prediction
 - 2260/8211 . . . of the weather
 - 2260/83 . Testing, e.g. methods, components or tools therefor
 - 2260/84 . Modelling or simulation
 - 2260/845 . Redundancy
 - 2260/85 . Starting
 - 2260/90 . Braking
 - 2260/901 . . using aerodynamic forces, i.e. lift or drag
 - 2260/9011 . . . of the tips of rotor blades
 - 2260/902 . . using frictional mechanical forces
 - 2260/903 . . using electrical or magnetic forces
 - 2260/904 . . using hydrodynamic forces
 - 2260/95 . Preventing corrosion ([coating or surface treatment F05B 2230/90](#))
 - 2260/96 . Preventing, counteracting or reducing vibration or noise
 - 2260/962 . . my means creating "anti-noise"
 - 2260/964 . . by damping means
 - 2260/966 . . by correcting static or dynamic imbalance
 - 2260/97 . Reducing windage losses
 - 2260/972 . . in radial flow machines
 - 2260/98 . Lubrication
 - 2260/99 . Radar absorption
- 2270/00 Control**
- 2270/10 . Purpose of the control system
 - 2270/101 . . to control rotational speed (n)
 - 2270/1011 . . . to prevent overspeed
 - 2270/1012 . . . to prevent underspeed
 - 2270/1013 . . . of different spools or shafts
 - 2270/1014 . . . to keep rotational speed constant
 - 2270/1016 . . in variable speed operation
 - 2270/102 . . to control acceleration (u)
 - 2270/1021 . . . by keeping it below damagingly high values
 - 2270/1022 . . . by making it as high as possible
 - 2270/103 . . to affect the output of the engine
 - 2270/1031 . . . Thrust
 - 2270/1032 . . . Torque
 - 2270/1033 . . . Power (if explicitly mentioned)
 - 2270/104 . . to match engine to driven device
 - 2270/1041 . . . in particular the electrical frequency of driven generator
 - 2270/105 . . to improve fuel economy
 - 2270/1051 . . . in particular at idling speed
 - 2270/106 . . to produce clean exhaust gases
 - 2270/1061 . . . with as little smoke as possible
 - 2270/1062 . . . with as little NOx's as possible
 - 2270/1063 . . . by monitoring combustion conditions
 - 2270/1064 indirectly, at the exhaust
 - 2270/107 . . to cope with emergencies
 - 2270/1071 . . . in particular sudden load loss
 - 2270/10711 applying a low voltage ride through method
 - 2270/1072 . . . in particular blow-out and relight
 - 2270/1073 . . . of one engine in a multi-engine system
 - 2270/1074 . . . by using back-up controls
 - 2270/1075 . . . by temporary overriding set control limits
 - 2270/1076 . . . caused by water or hail ingestion
 - 2270/108 . . to cope with, or avoid, compressor flow instabilities
 - 2270/1081 . . . Compressor surge or stall
 - 2270/10812 caused by working fluid flow velocity profile distortion
 - 2270/10815 due to high angle of attack of aircraft
 - 2270/10817 due to compressor degradation
 - 2270/109 . . to prolong engine life
 - 2270/1091 . . . by limiting temperatures
 - 2270/1095 . . . by limiting mechanical stresses
 - 2270/1097 . . . by preventing reverse rotation
 - 2270/11 . . to maintain desired vehicle trajectory parameters
 - 2270/1101 . . . Altitude
 - 2270/1102 . . . Speed or Mach number
 - 2270/111 . . to control two or more engines simultaneously
 - 2270/15 . . to control thermoacoustic behaviour in the combustion chambers ([counteracting noise or vibration F05B 2260/96](#))
 - 2270/16 . . to control water or steam injection
 - 2270/17 . . to avoid excessive deflection of the blades
 - 2270/18 . . to control buoyancy
 - 2270/19 . . to avoid stroboscopic flicker shadow on surroundings
 - 2270/20 . . to optimise the performance of a machine
 - 2270/30 . Control parameters, e.g. input parameters
 - 2270/301 . . Pressure
 - 2270/3011 . . . Inlet
 - 2270/3013 . . . Outlet
 - 2270/3015 . . . differential
 - 2270/303 . . Temperature
 - 2270/3032 . . . excessive temperatures, e.g. caused by overheating
 - 2270/304 . . Spool rotational speed
 - 2270/305 . . Tolerances
 - 2270/309 . . Rate of change of parameters
 - 2270/31 . . Fuel schedule for stage combustors

2270/32	. . Wind speeds	2280/10	. Inorganic materials, e.g. metals
2270/3201	. . . "cut-off" or "shut-down" wind speed	2280/101	. . Iron
2270/321	. . Wind directions	2280/1011	. . Cast iron
2270/322	. . the detection or prediction of a wind gust	2280/102	. . Light metals
2270/323	. . Air humidity	2280/1021	. . . Aluminium
2270/324	. . Air pressure	2280/1022	. . . Beryllium
2270/325	. . Air temperature	2280/1023	. . . Boron
2270/326	. . Rotor angle	2280/1024	. . . Lithium
2270/327	. . Rotor or generator speeds	2280/1025	. . . Magnesium
2270/328	. . Blade pitch angle	2280/103	. . Heavy metals
2270/329	. . Azimuth or yaw angle	2280/10301	. . . Refractory metals, e.g. V, W
2270/33	. . Proximity of blade to tower	2280/10302	. . . Chromium
2270/331	. . Mechanical loads	2280/10303	. . . Molybdenum
2270/332	. . Maximum loads or fatigue criteria	2280/10304	. . . Titanium
2270/333	. . Noise or sound levels	2280/10305	. . . Zirconium
2270/334	. . Vibration measurements	2280/10306	. . . Hafnium
2270/335	. . Output power or torque	2280/10307	. . . Manganese
2270/336	. . Blade lift measurements	2280/10308	. . . Lead
2270/337	. . Electrical grid status parameters, e.g. voltage, frequency or power demand	2280/10309	. . . Tin
2270/40	. Type of control system	2280/1031	. . . Zinc
2270/402	. . passive or reactive, e.g. using large wind vanes	2280/10311	. . . Mercury
2270/404	. . active, predictive, or anticipative	2280/104	. . Noble metals
2270/50	. Control logic embodiment by	2280/1041	. . . Silver
2270/502	. . electrical means, e.g. relays or switches	2280/1042	. . . Gold
2270/504	. . electronic means, e.g. electronic tubes, transistors or IC's within an electronic circuit	2280/1043	. . . Platinum group, e.g. Pt, Ir
2270/506	. . hydraulic means, e.g. hydraulic valves within a hydraulic circuit	2280/1044	. . . Palladium
2270/508	. . mechanical means, e.g. levers, gears or cams	2280/1045	. . . Ruthenium
2270/60	. Control system actuates through	2280/1046	. . . Osmium
2270/602	. . electrical actuators	2280/1047	. . . Iridium
2270/604	. . hydraulic actuators	2280/1048	. . . Rhodium
2270/605	. . Pneumatic actuators	2280/105	. . Copper
2270/606	. . mechanical actuators (F05B 2270/602 takes precedence)	2280/106	. . Rare earth metals, e.g. Sc, Y
2270/70	. Type of control algorithm	2280/107	. . Alloys
2270/701	. . proportional	2280/1071	. . . Steel alloys
2270/702	. . differential	2280/1072	. . Copper alloys
2270/703	. . integral	2280/10721	. . . Bronze
2270/704	. . proportional-differential	2280/10722	. . . Phosphor-bronze alloy
2270/705	. . proportional-integral	2280/10723	. . . Nickel-Copper alloy, e.g. monel
2270/706	. . proportional-integral-differential	2280/1073	. . Aluminium alloy, e.g. AlCuMgPb
2270/707	. . fuzzy logic	2280/1074	. . Alloys not otherwise provided for
2270/708	. . with comparison tables	2280/10741	. . . Superalloys
2270/709	. . with neural networks	2280/10742	. . . Heat stable alloys
2270/80	. Devices generating input signals, e.g. transducers, sensors, cameras or strain gauges	2280/10743	. . . Ni - Si alloys
2270/802	. . Calibration thereof	2280/10744	. . . Metal-aluminide intermetallic compounds
2270/803	. . Sampling thereof	2280/20	. Inorganic materials, e.g. non-metallic materials
2270/804	. . Optical devices	2280/2001	. . Glass
2270/8041	. . . Cameras	2280/20011	. . . MIBA
2270/8042	. . . Lidar systems	2280/20012	. . . Quartz
2270/805	. . Radars	2280/2002	. . Phosphor
2270/806	. . Sonars	2280/2003	. . Silicon
2270/807	. . Accelerometers	2280/2004	. . Ceramics; Oxides
2270/808	. . Strain gauges; Load cells	2280/20041	. . . Aluminium oxides
2270/809	. . Encoders	2280/20042	. . . Zinc oxides
2270/81	. . Microphones	2280/20043	. . . Zirconium oxides
2270/821	. . Displacement measuring means, e.g. inductive	2280/2005	. . Non-oxide ceramics
2280/00	Materials; Properties thereof	2280/2006	. . Carbon, e.g. graphite
		2280/2007	. . Carbides
		2280/20071	. . . of silicon
		2280/20072	. . . of titanium, e.g. TiB
		2280/20073	. . . of wolfram, e.g. tungsten carbide
		2280/2008	. . Nitrides

F05B

- 2280/20081 . . . of aluminium
- 2280/20082 . . . of boron
- 2280/20083 . . . of silicon
- 2280/20084 . . . of titanium
- 2280/20085 . . . of zirconium
- 2280/2009 . . Sulfides
- 2280/20091 . . . of molybdenum
- 2280/201 . . Sapphire
- 2280/2011 . . Aluminium titanate
- 2280/2013 . . Silica
- 2280/2014 . . Arsenic
- 2280/2015 . . Antimony
- 2280/2016 . . Bismuth
- 2280/2017 . . Barium
- 2280/30 . Inorganic materials not otherwise provided for
- 2280/40 . Organic materials
- 2280/4001 . . Leather
- 2280/4002 . . Cellulosic materials, e.g. wood
- 2280/4003 . . Synthetic polymers, e.g. plastics; Rubber
- 2280/4004 . . Rubber
- 2280/4005 . . PTFE [PolyTetraFluorEthylene]
- 2280/4006 . . Polyamides, e.g. NYLON
- 2280/4007 . . Thermoplastics
- 2280/4008 . . Polyamides, e.g. Aurum
- 2280/4009 . . Polyetherketones, e.g. PEEK
- 2280/401 . . Silicon polymers
- 2280/4011 . . Organic materials not otherwise provided for
- 2280/50 . Intrinsic material properties or characteristics
- 2280/5001 . . Elasticity
- 2280/5002 . . Thermal properties
- 2280/5003 . . Expansivity
- 2280/50031 . . . similar
- 2280/50032 . . . dissimilar
- 2280/5004 . . Heat transfer
- 2280/5005 . . Reflective properties
- 2280/5006 . . Shape memory
- 2280/5007 . . Hardness
- 2280/5008 . . Magnetic properties
- 2280/5009 . . non-magnetic
- 2280/501 . . Self lubricating materials; Solid lubricants
- 2280/5011 . . Surface roughness
- 2280/60 . Properties or characteristics given to material by treatment or manufacturing
- 2280/6001 . . Fabrics
- 2280/6002 . . . Woven fabrics
- 2280/6003 . . Composites; e.g. fibre-reinforced
- 2280/6004 . . amorphous
- 2280/6005 . . crystalline
- 2280/6006 . . Directionally-solidified crystalline structures
- 2280/6007 . . monocrystalline
- 2280/6008 . . Structures
- 2280/6009 . . Grain size
- 2280/601 . . Syntactic
- 2280/6011 . . Coating
- 2280/6012 . . Foam
- 2280/6013 . . Fibres
- 2280/6014 . . Filler
- 2280/6015 . . Resin
- 2280/70 . Treatments or modification of materials
- 2280/701 . . Heat treatments
- 2280/702 . . Reinforcements