

# 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
- 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
- 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
<b>2250/00</b>		<b>Geometry</b>
		<b>NOTE</b>
		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
<b>2260/00</b>		<b>Function</b>

- 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
- 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
- 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<sub>2</sub>
- 2260/611 . . Sequestration of CO<sub>2</sub>
- 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

- 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 NO<sub>x</sub> 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
- 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	2300/18	. . Intermetallic compounds
2270/803	. . Sampling thereof	2300/182	. . . Metal-aluminide intermetallic compounds
2270/804	. . Optical devices	2300/20	. Oxide or non-oxide ceramics
2270/8041	. . . Cameras	2300/21	. . Oxide ceramics
2270/805	. . Radars	2300/2102	. . . Glass
2270/806	. . Sonars	2300/2104	. . . MIBA
2270/807	. . Accelerometers	2300/2106	. . . Quartz
2270/808	. . Strain gauges; Load cells	2300/2108	. . . Phosphor
2270/809	. . Encoders	2300/211	. . . Silica
2270/81	. . Microphones	2300/2112	. . . Aluminium oxides
2270/821	. . Displacement measuring means, e.g. inductive	2300/2114	. . . Sapphire
		2300/2116	. . . Zinc oxide
<b>2300/00</b>	<b>Materials; Properties thereof</b>	2300/2118	. . . Zirconium oxides
2300/10	. Metals, alloys or intermetallic compounds	2300/212	. . . Aluminium titanate
2300/11	. . Iron	2300/22	. . Non-oxide ceramics
2300/111	. . . Cast iron	2300/222	. . . Silicon
2300/12	. . Light metals	2300/224	. . . Carbon, e.g. graphite
2300/121	. . . Aluminium	2300/226	. . . Carbides
2300/122	. . . Beryllium	2300/2261	. . . . of silicon
2300/123	. . . Boron	2300/2262	. . . . of titanium, e.g. TiC
2300/124	. . . Lithium	2300/2263	. . . . of tungsten, e.g. WC
2300/125	. . . Magnesium	2300/228	. . . Nitrides
2300/13	. . Refractory metals, i.e. Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, W	2300/2281	. . . . of aluminium
		2300/2282	. . . . of boron
2300/131	. . . Molybdenum	2300/2283	. . . . of silicon
2300/132	. . . Chromium	2300/2284	. . . . of titanium
2300/133	. . . Titanium	2300/2285	. . . . of zirconium
2300/134	. . . Zirconium	2300/229	. . . Sulfides
2300/135	. . . Hafnium	2300/2291	. . . . of molybdenum
2300/14	. . Noble metals, i.e. Ag, Au, platinum group metals	2300/30	. Inorganic materials other than provided for in groups <a href="#">F05D 2300/10</a> - <a href="#">F05D 2300/2291</a>
2300/141	. . . Silver	2300/40	. Organic materials
2300/142	. . . Gold	2300/41	. . Leather
2300/143	. . . Platinum group metals, i.e. Os, Ir, Pt, Ru, Rh, Pd	2300/42	. . Cellulosic materials, e.g. wood
		2300/43	. . Synthetic polymers, e.g. plastics; Rubber
2300/1431	. . . . Palladium	2300/431	. . . Rubber
2300/1432	. . . . Ruthenium	2300/432	. . . PTFE [PolyTetraFluorEthylene]
2300/1433	. . . . Osmium	2300/433	. . . Polyamides, e.g. NYLON
2300/1434	. . . . Iridium	2300/434	. . . Polyimides, e.g. AURUM
2300/1435	. . . . Rhodium	2300/436	. . . Polyetherketones, e.g. PEEK
2300/15	. . Rare earth metals, i.e. Sc, Y, lanthanides	2300/437	. . . Silicon polymers
2300/16	. . Other metals not provided for in groups <a href="#">F05D 2300/11</a> - <a href="#">F05D 2300/15</a>	2300/44	. . Resins
		2300/48	. . other organic materials
2300/1602	. . . Arsenic	2300/50	. Intrinsic material properties or characteristics
2300/1604	. . . Antimony	2300/501	. . Elasticity
2300/1606	. . . Bismuth	2300/502	. . Thermal properties
2300/1608	. . . Barium	2300/5021	. . . Expansivity
2300/161	. . . Manganese	2300/50211	. . . . similar
2300/1612	. . . Lead	2300/50212	. . . . dissimilar
2300/1614	. . . Tin	2300/5023	. . . Thermal capacity
2300/1616	. . . Zinc	2300/5024	. . . Heat conductivity
2300/1618	. . . Mercury	2300/504	. . Reflective properties
2300/17	. . Alloys	2300/505	. . Shape memory behaviour
2300/171	. . . Steel alloys	2300/506	. . Hardness
2300/172	. . . Copper alloys	2300/507	. . Magnetic properties
2300/1721	. . . . Bronze	2300/509	. . Self lubricating materials; Solid lubricants
2300/1722	. . . . Phosphor-bronze alloy	2300/51	. . Hydrophilic, i.e. being or having wetttable properties
2300/1723	. . . . Nickel-Copper alloy, e.g. Monel		
2300/173	. . . Aluminium alloys, e.g. AlCuMgPb	2300/512	. . Hydrophobic, i.e. being or having non-wetttable properties
2300/174	. . . Titanium alloys, e.g. TiAl		
2300/175	. . . Superalloys	2300/514	. . Porosity
2300/176	. . . Heat-stable alloys		
2300/177	. . . Ni - Si alloys		

## F05D

- 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