

CPC COOPERATIVE PATENT CLASSIFICATION

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

ENGINEERING IN GENERAL

F16 ENGINEERING ELEMENTS AND UNITS; GENERAL MEASURES FOR PRODUCING AND MAINTAINING EFFECTIVE FUNCTIONING OF MACHINES OR INSTALLATIONS; THERMAL INSULATION IN GENERAL

F16C SHAFTS; FLEXIBLE SHAFTS; ELEMENTS OR CRANKSHAFT MECHANISMS; ROTARY BODIES OTHER THAN GEARING ELEMENTS; BEARINGS

NOTES

- In this subclass the following expression is used with the meaning indicated:
 - "rotary bodies other than gearing elements" covers any element which rotates so far as its features are affected only by the fact that it rotates.
- Attention is drawn to the following places:

A01B 71/04	Bearings for agricultural machines
B21B 31/07	Adaptation of roll bearings for metal-rolling mills
B61C 17/10	Connecting-rods, bearings for driving wheels of railway locomotives
B61F 15/00	Axle-boxes for railway vehicles
B62K 21/06	Bearings for steering heads
E06B 9/174 , E06B 9/50	Bearings specially adapted for roller shutters or for roller blinds
E21B 10/22	Bearings for drill bits
F01C 21/02	Arrangement of bearings in rotary-piston machines or engines
F01D 25/16	Arrangement of bearings in non-positive displacement machines or engines
F02C 7/06	Arrangement of bearings in gas-turbine plants
G01C 19/16	Bearings for gyroscopes
G01D 11/02	Bearings or suspensions for moving parts of measuring instruments
G01G 21/02	Arrangements of bearings in weighing apparatus
G01R 1/10	Arrangements of bearings in instruments for measuring electric variables
G01R 11/12	Arrangements of bearings for apparatus for measuring time integral of electric power or current
G02C 5/22	Hinges for spectacles
G04B 31/00	Bearings for clockwork
H02N 15/00	Magnetic levitation devices.

WARNING

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.

1/00	Flexible shafts (flexible shafts in dental machines for boring or cutting A61C 1/18); Mechanical means for transmitting movement in a flexible sheathing	1/106	. . {Plurality of transmitting means, e.g. two or more parallel "Bowden cables"}
1/02	. for conveying rotary movements	1/107	. . {Sealing details}
1/04	. . Articulated shafts	1/108	. . {Reducing or controlling of vibrations, e.g. by resilient damping of noise}
1/06	. . with guiding sheathing, tube or box (F16C 1/04 takes precedence; guiding sheathings F16C 1/26)	1/12	. . Arrangements for transmitting movement to or from the flexible member
1/08	. . End connections	1/14	. . . Construction of the end-piece of the flexible member; Attachment thereof to the flexible member
1/10	. Means for transmitting linear movement in a flexible sheathing, e.g. "Bowden-mechanisms" (guiding-sheathings F16C 1/26)	1/145	. . . . {Attachment of the end-piece to the flexible member}
1/101	. . {Intermediate connectors for joining portions of split flexible shafts and/or sheathings}	1/16	. . . in which the end-piece is guided rectilinearly
1/102	. . {Arrangements to mount end fittings of the sheathings to support walls or brackets}	1/18	. . . in which the end portion of the flexible member is laid along a curved surface of a pivoted member
1/103	. . . {to a hole in the wall or bracket}		
1/105	. . . {to a slot in the bracket}		

- 1/20 . . Construction of flexible members moved to and fro in the sheathing
- 1/205 . . . {Details of the outer surface of the flexible member, e.g. coatings}
- 1/22 . . Adjusting; Compensating length
- 1/223 . . . {by adjusting the effective length of the flexible member}
- 1/226 . . . {by adjusting the effective length of the sheathing}
- 1/24 . Lubrication; Lubricating equipment
- 1/26 . Construction of guiding-sheathings or guiding-tubes
- 1/262 . . {End fittings; Attachment thereof to the sheathing or tube}
- 1/265 . . . {with a swivel tube connected to the end-fitting of a sheathing, e.g. with a spherical joint}
- 1/267 . . {Details of the inner surface of the sheathing or tube, e.g. coatings}
- 1/28 . . with built in bearings {, e.g. sheathing with rolling elements between the sheathing and the core element}
- 3/00 Shafts (flexible shafts [F16C 1/00](#); marine propeller shafts, paddle wheel shafts [B63H 23/34](#)); Axles; Cranks; Eccentrics**
- 3/02 . Shafts; Axles
- 3/023 . . {made of several parts, e.g. by welding}
- 3/026 . . {Shafts made of fibre reinforced resin}
- 3/03 . . telescopic (axially displaceable couplings [F16D 3/06](#))
- 3/035 . . . with built-in bearings
- 3/04 . Crankshafts, eccentric-shafts; Cranks, eccentrics
- 3/06 . . Crankshafts
- 3/08 . . . made in one piece (features relating to lubrication [F16C 3/14](#), to cooling [F16C 3/16](#))
- 3/10 . . . assembled of several parts, e.g. by welding {by crimping}
- 3/12 releasably connected
- 3/14 . . . Features relating to lubrication
- 3/16 . . . Features relating to cooling
- 3/18 . . Eccentric-shafts
- 3/20 . . Shape of crankshafts or eccentric-shafts having regard to balancing
- 3/22 . . Cranks; Eccentrics (constructional features of crank-pins [F16C 11/02](#))
- 3/24 . . . with return cranks, i.e. a second crank carried by the crank-pin
- 3/26 . . . Elastic crank-webs; Resiliently-mounted crank-pins
- 3/28 . . . Adjustable cranks or eccentrics
- 3/30 . . . with arrangements for overcoming dead-centres
- 5/00 Crossheads; Constructions of connecting-rod heads or piston-rod connections rigid with crossheads (piston-rods, i.e. rods rigidly connected to the piston, [F16J 7/00](#))**
- 7/00 Connecting-rods or like links pivoted at both ends (coupling-rods for locomotive driving-wheels [B61C 17/10](#)); Construction of connecting-rod heads (heads rigid with crossheads [F16C 5/00](#))**
- 7/02 . Constructions of connecting-rods with constant length
- 7/023 . . {for piston engines, pumps or the like}
- 7/026 . . {made of fibre reinforced resin}
- 7/04 . with elastic intermediate part of fluid cushion
- 7/06 . Adjustable connecting-rods
- 7/08 . made from sheet metal
- 9/00 Bearings for crankshafts or connecting-rods; Attachment of connecting-rods (lubrication of connecting-rods in connection with crankshafts [F16C 3/14](#); connections to crossheads [F16C 5/00](#); to pistons [F16J 1/14](#))**
- 9/02 . Crankshaft bearings
- 9/03 . . Arrangements for adjusting play
- 9/04 . Connecting-rod bearings; Attachments thereof
- 9/045 . . {the bearing cap of the connecting rod being split by fracturing}
- 9/06 . . Arrangements for adjusting play in bearings, operating either automatically or not
- 11/00 Pivots; Pivotal connections (arrangements of steering linkage connections [B62D 7/16](#))**
- 11/02 . Trunnions; Crank-pins (fastening crank-pins to webs, crank-pins integral with cranks [F16C 3/06](#), [F16C 3/22](#))
- 11/04 . Pivotal connections (hinges for doors, windows or wings [E05D](#))
- 11/045 . . {with at least a pair of arms pivoting relatively to at least one other arm, all arms being mounted on one pin (crank-pins [F16C 11/02](#))}
- 11/06 . . Ball-joints; Other joints having more than one degree of angular freedom, i.e. universal joints (universal joints in which flexibility is produced by means of pivots or sliding or rolling connecting parts [F16D 3/16](#))
- 11/0604 . . . {Construction of the male part}
- 11/0609 {made from two or more parts}
- 11/0614 . . . {the female part of the joint being open on two sides}
- 11/0619 . . . {the female part comprising a blind socket receiving the male part}
- 11/0623 {Construction or details of the socket member}
- 11/0628 {with linings}
- 11/0633 {the linings being made of plastics}
- 11/0638 {characterised by geometrical details}
- 11/0642 {Special features of the plug or cover on the blind end of the socket}
- 11/0647 {Special features relating to adjustment for wear or play; Wear indicators}
- 11/0652 {combined with a damper other than elastic linings}
- 11/0657 {the socket member being mainly made of plastics}
- 11/0661 . . . {the two co-operative parts each having both convex and concave interfaces}
- 11/0666 . . . {Sealing means between the socket and the inner member shaft}
- 11/0671 {allowing operative relative movement of joint parts due to flexing of the sealing means}
- 11/0676 {allowing operational relative movement of joint parts due to sliding between parts of the sealing means}
- 11/068 . . . {Special features relating to lubrication}
- 11/0685 . . . {Manufacture of ball-joints and parts thereof, e.g. assembly of ball-joints}

- 11/069 {with at least one separate part to retain the ball member in the socket; Quick-release systems}
- 11/0695 . . . {Mounting of ball-joints, e.g. fixing them to a connecting rod}
- 11/08 . . . with resilient bearings
- 11/083 {by means of parts of rubber or like materials}
- 11/086 {with an elastomeric member in the blind end of a socket}
- 11/10 . . Arrangements for locking
- 11/103 . . . {frictionally clamped}
- 11/106 {for ball joints}
- 11/12 . . incorporating flexible connections, e.g. leaf springs
- 13/00** **Rolls, drums, discs, or the like** (guide rollers in feeding webs [B65H 27/00](#); calender rolls, bearings therefor [D21G 1/02](#); rotary drums or rollers for heat-exchange or heat-transfer apparatus [F28F 5/02](#); special adaptations, see the relevant classes); **Bearings or mountings therefor**
- 13/003 . {Bowed or curved rolls (rollers with a bowed axis as tentering devices for tensioning, smoothing or guiding webs [B65H 23/0258](#))}
- 13/006 . {Guiding rollers, wheels or the like, formed by or on the outer element of a single bearing or bearing unit, e.g. two adjacent bearings, whose ratio of length to diameter is generally less than one}
- 13/02 . Bearings
- 13/022 . . {supporting a hollow roll mantle rotating with respect to a yoke or axle}
- 13/024 . . . {adjustable for positioning, e.g. radial movable bearings for controlling the deflection along the length of the roll mantle}
- 13/026 {by fluid pressure}
- 13/028 {with a plurality of supports along the length of the roll mantle, e.g. hydraulic jacks}
- 13/04 . . Bearings with only partial enclosure of the member to be borne; Bearings with local support at two or more points
- 13/06 . . self-adjusting
- 15/00** **Construction of rotary bodies to resist centrifugal force** (flywheels, correction weights [F16F 15/30](#), [F16F 15/32](#))
- Bearings for rotary parts**
- 17/00** **Sliding-contact bearings for exclusively rotary movement** ([F16C 32/06](#) takes precedence; adjustable bearings [F16C 23/00](#), [F16C 25/00](#))
- 17/02 . for radial load only
- 17/022 . . {with a pair of essentially semicircular bearing sleeves}
- 17/024 . . {with flexible leaves to create hydrodynamic wedge, e.g. radial foil bearings}
- 17/026 . . {with helical grooves in the bearing surface to generate hydrodynamic pressure, e.g. herringbone grooves}
- 17/028 . . {with fixed wedges to generate hydrodynamic pressure, e.g. multi-lobe bearings}
- 17/03 . . with tiltably-supported segments, e.g. Michell bearings {(hydrostatic bearings with tiltably supported bearing pads [F16C 32/0666](#); made from a plurality of rods [F16C 33/26](#); with flexible leaves [F16C 17/024](#); hydrodynamic bearings with chambers [F16C 33/1075](#))}
- 17/035 . . . {the segments being integrally formed with, or rigidly fixed to, a support-element}
- 17/04 . for axial load only
- 17/042 . . {with flexible leaves to create hydrodynamic wedge, e.g. axial foil bearings}
- 17/045 . . {with grooves in the bearing surface to generate hydrodynamic pressure, e.g. spiral groove thrust bearings}
- 17/047 . . {with fixed wedges to generate hydrodynamic pressure}
- 17/06 . . with tiltably-supported segments, e.g. Michell bearings {(with flexible leaves [F16C 17/042](#); hydrostatic [F16C 32/0666](#))}
- 17/065 . . . {the segments being integrally formed with, or rigidly fixed to, a support-element}
- 17/08 . . for supporting the end face of a shaft or other member, e.g. footstep bearings
- 17/10 . for both radial and axial load
- 17/102 . . {with grooves in the bearing surface to generate hydrodynamic pressure}
- 17/105 . . . {with at least one bearing surface providing angular contact, e.g. conical or spherical bearing surfaces}
- 17/107 . . . {with at least one surface for radial load and at least one surface for axial load}
- 17/12 . characterised by features not related to the direction of the load
- 17/14 . . specially adapted for operating in water
- 17/18 . . with floating brasses or brushing, rotatable at a reduced speed {([F16C 17/03](#), [F16C 17/06](#) take precedence)}
- 17/20 . . with emergency supports or bearings
- 17/22 . . with arrangements compensating for thermal expansion
- 17/24 . . with devices affected by abnormal or undesired positions, e.g. for preventing overheating, for safety
- 17/243 . . . {related to temperature and heat, e.g. for preventing overheating}
- 17/246 . . . {related to wear, e.g. sensors for measuring wear}
- 17/26 . Systems consisting of a plurality of sliding-contact bearings
- 19/00** **Bearings with rolling contact, for exclusively rotary movement** (adjustable bearings [F16C 23/00](#), [F16C 25/00](#) {; electrically insulating bearings [H02K 5/173](#)})
- 19/02 . with bearing balls essentially of the same size in one or more circular rows
- 19/04 . . for radial load mainly
- 19/06 . . . with a single row or balls
- 19/08 . . . with two or more rows of balls
- 19/10 . . for axial load mainly
- 19/12 . . . for supporting the end face of a shaft or other member, e.g. footstep bearings
- 19/14 . . for both radial and axial load
- 19/16 . . . with a single row of balls

- 19/163 {with angular contact}
- 19/166 {Four-point-contact ball bearings}
- 19/18 . . . with two or more rows of balls
- 19/181 {with angular contact}
- 19/182 {in tandem arrangement}
- 19/183 {with two rows at opposite angles}
- 19/184 {in O-arrangement}
- 19/185 {with two raceways provided integrally on a part other than a race ring, e.g. a shaft or housing}
- 19/186 {with three raceways provided integrally on parts other than race rings, e.g. third generation hubs}
- 19/187 {with all four raceways integrated on parts other than race rings, e.g. fourth generation hubs}
- 19/188 {with at least one row for radial load in combination with at least one row for axial load}
- 19/20 . . with loose spacing bodies, e.g. balls, between the bearing balls
- 19/22 . . with bearing rollers essentially of the same size in one or more circular rows, e.g. needle bearings
- 19/225 . . {Details of the ribs supporting the end of the rollers}
- 19/24 . . for radial load mainly
- 19/26 . . . with a single row of rollers
- 19/28 . . . with two or more rows of rollers
- 19/30 . . for axial load mainly
- 19/305 . . . {consisting of rollers held in a cage}
- 19/32 . . . for supporting the end face of a shaft or other member, e.g. footstep bearings
- 19/34 . . for both radial and axial load
- 19/36 . . . with a single row of rollers
- 19/361 {with cylindrical rollers}
- 19/362 {the rollers being crossed within the single row}
- 19/364 {with tapered rollers, i.e. rollers having essentially the shape of a truncated cone}
- 19/38 . . . with two or more rows of rollers
- 19/381 {with at least one row for radial load in combination with at least one row for axial load}
- 19/383 {with tapered rollers, i.e. rollers having essentially the shape of a truncated cone}
- 19/385 {with two rows, i.e. double-row tapered roller bearings}
- 19/386 {in O-arrangement}
- 19/388 {with four rows, i.e. four row tapered roller bearings}
- 19/40 . . with loose spacing bodies between the rollers
- 19/44 . . Needle bearings
- 19/46 . . . with one row or needles
- 19/463 {consisting of needle rollers held in a cage, i.e. subunit without race rings}
- 19/466 {comprising needle rollers and an outer ring, i.e. subunit without inner ring}
- 19/48 . . . with two or more rows of needles
- 19/49 . . Bearings with both balls and rollers
- 19/492 . . {with two or more rows with angular contact}
- 19/495 . . . {with two rows}
- 19/497 {in O-arrangement}
- 19/50 . . Other types of ball or roller bearings
- 19/502 . . {with rolling elements in rows not forming a full circle}
- 19/505 . . . {with the diameter of the rolling elements of one row differing from the diameter of those of another row}
- 19/507 . . {with rolling elements journaled in one of the moving parts, e.g. stationary rollers to support a rotating part}
- 19/52 . . with devices affected by abnormal or undesired conditions
- 19/522 . . . {related to load on the bearing, e.g. bearings with load sensors or means to protect the bearing against overload}
- 19/525 . . . {related to temperature and heat, e.g. insulation}
- 19/527 . . . {related to vibration and noise}
- 19/54 . . Systems consisting of a plurality of bearings with rolling friction ([spindle bearings F16C 35/08](#))
- 19/541 . . . {Systems consisting of juxtaposed rolling bearings including at least one angular contact bearing}
- 19/542 . . . {with two rolling bearings with angular contact}
- 19/543 {in O-arrangement}
- 19/545 . . . {Systems comprising at least one rolling bearing for radial load in combination with at least one rolling bearing for axial load}
- 19/546 . . . {Systems with spaced apart rolling bearings including at least one angular contact bearing}
- 19/547 {with two angular contact rolling bearings}
- 19/548 {in O-arrangement}
- 19/55 . . . with intermediate floating {or independently-driven} rings rotating at reduced speed {or with other differential ball or roller bearings}
- 19/56 . . . in which the rolling bodies of one bearing differ in diameter from those of another
- 21/00** **Combinations of sliding-contact bearings with ball or roller bearings, for exclusively rotary movement** ([F16C 17/24](#), [F16C 19/52](#) take precedence)
- 21/005 . . {the external zone of a bearing with rolling members, e.g. needles, being cup-shaped, with or without a separate thrust-bearing disc or ring, e.g. for universal joints ([seals F16C 33/72](#), [F16D 3/38](#))}
- 23/00** **Bearings for exclusively rotary movement adjustable for aligning or positioning** ([F16C 27/00](#) takes precedence ; hydrostatic bearings [F16C 32/067](#))
- 23/02 . . Sliding-contact bearings
- 23/04 . . self-adjusting
- 23/041 . . . {with edge relief}
- 23/043 . . . {with spherical surfaces, e.g. spherical plain bearings}
- 23/045 {for radial load mainly, e.g. radial spherical plain bearings}
- 23/046 {with split outer rings}
- 23/048 {for axial load mainly}
- 23/06 . . Ball or roller bearings
- 23/08 . . self-adjusting
- 23/082 . . . {by means of at least one substantially spherical surface}
- 23/084 {sliding on a complementary spherical surface}
- 23/086 {forming a track for rolling elements}
- 23/088 {by means of crowning}

23/10	. Bearings, parts of which are eccentrically adjustable with respect to each other	29/0602	. . . {Details of the bearing body or carriage or parts thereof, e.g. methods for manufacturing or assembly}
25/00	Bearings for exclusively rotary movement adjustable for wear or play (F16C 27/00 takes precedence)	29/0604	. . . . {of the load bearing section}
25/02	. Sliding-contact bearings	29/0607	. . . . . {of parts or members for retaining the rolling elements, i.e. members to prevent the rolling elements from falling out of the bearing body or carriage}
25/04	. . self-adjusting	29/0609	. . . . . {of the ends of the bearing body or carriage where the rolling elements change direction, e.g. end caps}
25/045	. . . {with magnetic means to preload the bearing}	29/0611	. . . . . {of the return passages, i.e. the passages where the rolling elements do not carry load}
25/06	. Ball or roller bearings	29/0614	. . . {with a shoe type bearing body, e.g. a body facing one side of the guide rail or track only}
25/08	. . self-adjusting	29/0616	. . . . {for supporting load essentially in a single direction}
25/083	. . . {with resilient means acting axially on a race ring to preload the bearing}	29/0619	. . . . . {with rollers or needles}
25/086	. . . {with magnetic means to preload the bearing}	29/0621	. . . . . {for supporting load in essentially two directions, e.g. by multiple points of contact or two rows of rolling elements}
27/00	Elastic or yielding bearings or bearing supports, for exclusively rotary movement (shock-damping bearings for watches or clocks G04B 31/02)	29/0623	. . . . . {with balls}
27/02	. Sliding-contact bearings	29/0626	. . . . . {with rollers}
27/04	. Ball or roller bearings, e.g. with resilient rolling bodies	29/0628	. . . . . {crossed within a row}
27/045	. . {with a fluid film, e.g. squeeze film damping}	29/063	. . . {with a bearing body, e.g. a carriage or part thereof, provided between the legs of a U-shaped guide rail or track}
27/06	. by means of parts of rubber or like materials (F16C 27/08 takes precedence; with sliding surfaces of rubber or synthetic rubber F16C 33/22)	29/0633	. . . {with a bearing body defining a U-shaped carriage, i.e. surrounding a guide rail or track on three sides}
27/063	. . {Sliding contact bearings}	29/0635	. . . . {whereby the return paths are provided as bores in a main body of the U-shaped carriage, e.g. the main body of the U-shaped carriage is a single part with end caps provided at each end}
27/066	. . {Ball or roller bearings}	29/0638	. . . . . {with balls}
27/08	. primarily for axial load, e.g. for vertically-arranged shafts	29/064	. . . . . {with two rows of balls, one on each side of the rail}
{Other bearings}		29/0642	. . . . . {with four rows of balls}
29/00	Bearings for parts moving only linearly (F16C 32/06 takes precedence; incorporated in flexible shafts F16C 1/28 {; parts of bearings in general and special methods for making bearings or parts thereof in general F16C 33/00})	29/0645	. . . . . {with load directions in O-arrangement}
29/001	. {adjustable for alignment or positioning}	29/0647	. . . . . {with load directions in X-arrangement}
29/002	. {Elastic or yielding linear bearings or bearing supports}	29/065	. . . . . {with rollers}
29/004	. {Fixing of a carriage or rail, e.g. rigid mounting to a support structure or a movable part}	29/0652	. . . . . {whereby the return paths are at least partly defined by separate parts, e.g. covers attached to the legs of the main body of the U-shaped carriage}
29/005	. {Guide rails or tracks for a linear bearing, i.e. adapted for movement of a carriage or bearing body there along}	29/0654	. . . . . {with balls}
29/007	. {Hybrid linear bearings, i.e. including more than one bearing type, e.g. sliding contact bearings as well as rolling contact bearings}	29/0657	. . . . . {with two rows of balls, one on each side of the rail}
29/008	. {Systems with a plurality of bearings, e.g. four carriages supporting a slide on two parallel rails}	29/0659	. . . . . {with four rows of balls}
29/02	. Sliding-contact bearings	29/0661	. . . . . {with load directions in O-arrangement}
29/025	. . {Hydrostatic or aerostatic (this type of bearing for rotary parts F16C 32/06)}	29/0664	. . . . . {with load directions in X-arrangement}
29/04	. Ball or roller bearings	29/0666	. . . . . {with rollers}
29/041	. . {having rollers crossed within a row}	29/0669	. . . . . {whereby the main body of the U-shaped carriage is an assembly of at least three major parts, e.g. an assembly of a top plate with two separate legs attached thereto in the form of bearing shoes (bearing shoes per se F16C 29/0614)}
29/043	. . {with two massive rectangular rails having facing grooves}	29/0671	. . . . . {with balls}
29/045	. . {having rolling elements journaled in one of the moving parts}		
29/046	. . . {with balls journaled in pockets}		
29/048	. . {with thin walled races, e.g. tracks of sheet metal}		
29/06	. . in which the rolling bodies circulate partly without carrying load		

29/0673	. . . . . {with rollers}	32/0408	. . . . . {Passive magnetic bearings}
29/0676	. . . . . {with a bearing body or carriage almost fully embracing the guide rail or track, e.g. a circular sleeve with a longitudinal slot for the support posts of the rail}	32/041	. . . . . {with permanent magnets on one part attracting the other part}
29/0678	. . . . . {with a bearing body, i.e. the body carrying the circulating rolling elements, provided in the interior of a sleeve-like guide member defining the opposing raceways, e.g. in a telescopic shaft (telescopic shafts with built-in bearings F16C 3/035 ; yielding coupling allowing axial displacement by rolling elements F16D 3/065)}	32/0412	. . . . . {for radial load mainly}
29/068	. . . . . {with the bearing body fully encircling the guide rail or track}	32/0414	. . . . . {with facing axial projections}
29/0683	. . . . . {the bearing body encircles a rail or rod of circular cross-section, i.e. the linear bearing is not suited to transmit torque}	32/0417	. . . . . {for axial load mainly}
29/0685	. . . . . {with balls}	32/0419	. . . . . {with facing radial projections}
29/0688	. . . . . {whereby a sleeve surrounds the circulating balls and thicker part of the sleeve form the load bearing tracks}	32/0421	. . . . . {for both radial and axial load}
29/069	. . . . . {whereby discrete load bearing elements, e.g. discrete load bearing plates or discrete rods, are provided in a retainer and form the load bearing tracks}	32/0423	. . . . . {with permanent magnets on both parts repelling each other}
29/0692	. . . . . {the bearing body encircles a guide rail or track of non-circular cross-section, e.g. with grooves or protrusions, i.e. the linear bearing is suited to transmit torque (telescopic shafts with built-in bearings F16C 3/035 ; yielding coupling allowing axial displacement by rolling elements F16D 3/065)}	32/0425	. . . . . {for radial load mainly}
29/0695	. . . . . {with balls}	32/0427	. . . . . {for axial load mainly}
29/0697	. . . . . {with polygonal guide rail or track}	32/0429	. . . . . {for both radial and axial load, e.g. conical magnets}
29/08	. Arrangements for covering or protecting the ways {(protective coverings for parts of machine tools B23Q 11/08)}	32/0431	. . . . . {with bearings for axial load combined with bearings for radial load}
29/082	. . {fixed to the way}	32/0434	. . . . . {for parts moving linearly}
29/084	. . {fixed to the carriage or bearing body movable along the guide rail or track}	32/0436	. . . . . {with a conductor on one part movable with respect to a magnetic field, e.g. a body of copper on one part and a permanent magnet on the other part}
29/086	. . . {Seals being essentially U-shaped, e.g. for a U-shaped carriage}	32/0438	. . . . . {with a superconducting body, e.g. a body made of high temperature superconducting material such as YBaCuO}
29/088	. . . {Seals extending in the longitudinal direction of the carriage or bearing body}	32/044	. . . . . {Active magnetic bearings}
29/10	. Arrangements for locking the bearings	32/0442	. . . . . {with devices affected by abnormal, undesired or non-standard conditions such as shock-load, power outage, start-up or touchdown}
29/12	. Arrangements for adjusting play	32/0444	. . . . . {Details of devices to control the actuation of the electromagnets}
29/123	. . {using elastic means}	32/0446	. . . . . {Determination of the actual position of the moving member, e.g. details of sensors}
29/126	. . {using tapered surfaces or wedges}	32/0448	. . . . . {by using the electromagnet itself as sensor, e.g. sensorless magnetic bearings}
31/00	Bearings for parts which both rotate and move linearly	32/0451	. . . . . {Details of controllers, i.e. the units determining the power to be supplied, e.g. comparing elements, feedback arrangements with P.I.D. control}
31/02	. Sliding-contact bearings	32/0453	. . . . . {for controlling two axes, i.e. combined control of x-axis and y-axis}
31/04	. Ball or roller bearings	32/0455	. . . . . {including digital signal processing [DSP] and analog/digital conversion [A/D, D/A]}
31/06	. . in which the rolling bodies circulate partly without carrying load	32/0457	. . . . . {Details of the power supply to the electromagnets}
32/00	Bearings not otherwise provided for	32/0459	. . . . . {Details of the magnetic circuit}
32/02	. Knife-edge bearings	32/0461	. . . . . {of stationary parts of the magnetic circuit}
32/04	. using magnetic or electric supporting means	32/0463	. . . . . {with electromagnetic bias, e.g. by extra bias windings}
32/0402	. . {combined with other supporting means, e.g. hybrid bearings with both magnetic and fluid supporting means}	32/0465	. . . . . {with permanent magnets provided in the magnetic circuit of the electromagnets}
32/0404	. . {Electrostatic bearings}	32/0468	. . . . . {of moving parts of the magnetic circuit, e.g. of the rotor}
32/0406	. . {Magnetic bearings}	32/047	. . . . . {Details of housings; Mounting of active magnetic bearings}
		32/0472	. . . . . {for linear movement}
		32/0474	. . . . . {for rotary movement}
		32/0476	. . . . . {with active support of one degree of freedom, e.g. axial magnetic bearings}

- 32/0478 {with permanent magnets to support radial load}
- 32/048 {with active support of two degrees of freedom, e.g. radial magnetic bearings}
- 32/0482 {with three electromagnets to control the two degrees of freedom}
- 32/0485 {with active support of three degrees of freedom}
- 32/0487 {with active support of four degrees of freedom}
- 32/0489 {with active support of five degrees of freedom, e.g. two radial magnetic bearings combined with an axial bearing}
- 32/0491 {with electromagnets acting in axial and radial direction, e.g. with conical magnets}
- 32/0493 {integrated in an electrodynamic machine, e.g. self-bearing motor}
- 32/0495 {generating torque and axial force}
- 32/0497 {generating torque and radial force}
- 32/06 with moving member supported by a fluid cushion formed, at least to a large extent, otherwise than by movement of the shaft, e.g. hydrostatic air-cushion bearings
- 32/0603 . . {supported by a gas cushion, e.g. an air cushion}
- 32/0607 . . . {the gas being retained in a gap, e.g. squeeze film bearings}
- 32/0611 {by means of vibrations}
- 32/0614 . . . {the gas being supplied under pressure, e.g. aerostatic bearings}
- 32/0618 {via porous material}
- 32/0622 {via nozzles, restrictors}
- 32/0625 {via supply slits}
- 32/0629 . . {supported by a liquid cushion, e.g. oil cushion}
- 32/0633 . . . {the liquid being retained in a gap}
- 32/0637 {by a magnetic field, e.g. ferrofluid bearings}
- 32/064 . . . {the liquid being supplied under pressure}
- 32/0644 {Details of devices to control the supply of liquids to the bearings}
- 32/0648 {by sensors or pressure-responsive control devices in or near the bearings}
- 32/0651 {Details of the bearing area per se}
- 32/0655 {of supply openings}
- 32/0659 {of pockets or grooves}
- 32/0662 . . {Details of hydrostatic bearings independent of fluid supply or direction of load}
- 32/0666 . . . {of bearing pads}
- 32/067 . . . {of bearings adjustable for aligning, positioning, wear or play}
- 32/0674 {by means of pre-load on the fluid bearings}
- 32/0677 . . . {of elastic or yielding bearings or bearing supports}
- 32/0681 . . {Construction or mounting aspects of hydrostatic bearings, for exclusively rotary movement, related to the direction of load}
- 32/0685 . . . {for radial load only}
- 32/0688 {with floating bearing elements}
- 32/0692 . . . {for axial load only}
- 32/0696 . . . {for both radial and axial load}

Details or accessories of bearings

- 33/00** **Parts of bearings; Special methods for making bearings or parts thereof (metal-working or like operations, [see the relevant classes](#))**
- 33/02 Parts of sliding-contact bearings
- 33/04 Brasses; Bushes; Linings
- 33/043 {Sliding surface consisting mainly of ceramics, cermets or hard carbon, e.g. diamond like carbon [DLC]}
- 33/046 {divided or split, e.g. half-bearings or rolled sleeves}
- 33/06 Sliding surface mainly made of metal ([F16C 33/24 - F16C 33/28 take precedence](#); {casting metal bearing surfaces [B22D 15/02](#), [B22D 19/08](#)})
- 33/08 Attachment of brasses, bushes or linings to the bearing housing
- 33/10 Construction relative to lubrication {(lubrication in general [F16N](#))}
- 33/1005 {with gas, e.g. air, as lubricant}
- 33/101 {Details of the bearing surface, e.g. means to generate pressure such as lobes or wedges}
- 33/1015 {Pressure generating grooves}
- 33/102 {with grease as lubricant}
- 33/1025 {with liquid, e.g. oil, as lubricant}
- 33/103 {retained in or near the bearing}
- 33/1035 {by a magnetic field acting on a magnetic liquid}
- 33/104 {in a porous body, e.g. oil impregnated sintered sleeve}
- 33/1045 {Details of supply of the liquid to the bearing}
- 33/105 {Conditioning, e.g. metering, cooling, filtering}
- 33/1055 {from radial inside, e.g. via a passage through the shaft and/or inner sleeve}
- 33/106 {Details of distribution or circulation inside the bearings, e.g. details of the bearing surfaces to affect flow or pressure of the liquid}
- 33/1065 {Grooves on a bearing surface for distributing or collecting the liquid}
- 33/107 {Grooves for generating pressure}
- 33/1075 {Wedges, e.g. ramps or lobes, for generating pressure}
- 33/108 {with a plurality of elements forming the bearing surfaces, e.g. bearing pads}
- 33/1085 {Channels or passages to recirculate the liquid in the bearing}
- 33/109 {Lubricant compositions or properties, e.g. viscosity}
- 33/1095 {with solids as lubricant, e.g. dry coatings, powder}
- 33/12 Structural composition; Use of special materials or surface treatments, e.g. for rust-proofing
- 33/121 {Use of special materials}
- 33/122 {Multilayer structures of sleeves, washers or liners}
- 33/124 {Details of overlays}

33/125	. . . . . {Details of bearing layers, i.e. the lining}	33/3843	. . . . . {formed as one-piece cages, i.e. monoblock cages}
33/127	. . . . . {Details of intermediate layers, e.g. nickel dams}	33/385	. . . . . {made from metal, e.g. cast or machined window cages}
33/128	. . . . . {Porous bearings, e.g. bushes of sintered alloy}	33/3856	. . . . . {made from plastic, e.g. injection moulded window cages}
33/14	. . . . . Special methods of manufacture; Running-in	33/3862	. . . . . {comprising two annular parts joined together}
33/145	. . . . . {of sintered porous bearings}	33/3868	. . . . . {made from metal, e.g. two cast parts joined by rivets}
33/16	. . . Sliding surface consisting mainly of graphite	33/3875	. . . . . {made from plastic, e.g. two injection moulded parts joined by a snap fit}
33/18	. . . Sliding surface consisting mainly of wood or fibrous material	33/3881	. . . . . {with more than three parts, e.g. two end rings connected by individual stays}
33/20	. . . Sliding surface consisting mainly of plastics (F16C 33/22 - F16C 33/28 take precedence)	33/3887	. . . {Details of individual pockets, e.g. shape or ball retaining means}
33/201	. . . . . {Composition of the plastic}	33/3893	. . . {with rolling elements with smaller diameter than the load carrying balls, e.g. cages with counter-rotating spacers}
33/203	. . . . . {Multilayer structures, e.g. sleeves comprising a plastic lining}	33/40	. . . for multiple rows of balls
33/205	. . . . . {with two layers}	33/405	. . . . . {with two or more juxtaposed cages joined together or interacting with each other}
33/206	. . . . . {with three layers}	33/41	. . . comb-shaped
33/208	. . . . . {Methods of manufacture, e.g. shaping, applying coatings}	33/412	. . . . . {Massive or moulded comb cages, e.g. snap ball cages}
33/22	. . . Sliding surface consisting mainly of rubber or synthetic rubber (F16C 33/24 - F16C 33/28 take precedence)	33/414	. . . . . {formed as one-piece cages, i.e. monoblock comb cages}
33/24	. . . with different areas of the sliding surface consisting of different materials	33/416	. . . . . {made from plastic, e.g. injection moulded comb cages}
33/26	. . . made from wire coils; made from a number of discs, rings, rods, or other members	33/418	. . . . . {Details of individual pockets, e.g. shape or ball retaining means}
33/28	. . . with embedded reinforcements shaped as frames or meshed materials	33/42	. . . made from wire or sheet metal strips (F16C 33/40, F16C 33/41 take precedence)
33/30	. Parts of ball or roller bearings	33/422	. . . . . {made from sheet metal}
33/303	. . {of hybrid bearings, e.g. rolling bearings with steel races and ceramic rolling elements}	33/425	. . . . . {from a single part, e.g. ribbon cages with one corrugated annular part}
33/306	. . {Means to synchronise movements}	33/427	. . . . . {from two parts, e.g. ribbon cages with two corrugated annular parts}
33/32	. . Balls	33/44	. . . Selection of substances (F16C 33/40, F16C 33/41 take precedence)
33/34	. . Rollers; Needles	33/445	. . . . . {Coatings}
33/36	. . . with bearing-surfaces other than cylindrical, e.g. tapered; with grooves in the bearing surfaces	33/46	. . Cages for rollers or needles
33/363	. . . . . {with grooves in the bearing-surfaces}	33/4605	. . . {Details of interaction of cage and race, e.g. retention or centring}
33/366	. . . . . {Tapered rollers, i.e. rollers generally shaped as truncated cones}	33/4611	. . . {with hybrid structure, i.e. with parts made of distinct materials}
33/37	. . Loose spacing bodies	33/4617	. . . {Massive or moulded cages having cage pockets surrounding the rollers, e.g. machined window cages}
33/3706	. . . {with concave surfaces conforming to the shape of the rolling elements, e.g. the spacing bodies are in sliding contact with the rolling elements}	33/4623	. . . . . {formed as one-piece cages, i.e. monoblock cages}
33/3713	. . . {with other rolling elements serving as spacing bodies, e.g. the spacing bodies are in rolling contact with the load carrying rolling elements}	33/4629	. . . . . {made from metal, e.g. cast or machined window cages}
33/372	. . . rigid	33/4635	. . . . . {made from plastic, e.g. injection moulded window cages}
33/374	. . . resilient	33/4641	. . . . . {comprising two annular parts joined together}
33/38	. . Ball cages	33/4647	. . . . . {made from metal, e.g. two cast parts joined by rivets}
33/3806	. . . {Details of interaction of cage and race, e.g. retention, centring}	33/4652	. . . . . {made from plastic, e.g. two injection moulded parts joined by a snap fit}
33/3812	. . . {formed of interconnected segments, e.g. chains}	33/4658	. . . . . {comprising three annular parts, i.e. three piece roller cages}
33/3818	. . . {formed of unconnected segments}		
33/3825	. . . {formed as a flexible belt, e.g. spacers connected by a thin film}		
33/3831	. . . {with hybrid structure, i.e. with parts made of distinct materials}		
33/3837	. . . {Massive or moulded cages having cage pockets surrounding the balls, e.g. machined window cages}		

33/4664	. . . . {with more than three parts, e.g. two end rings connected by individual stays}	33/565	. . . . {Coatings}
33/467	. . . {Details of individual pockets, e.g. shape or roller retaining means}	33/58	. . Raceways; Race rings
33/4676	. . . . {of the stays separating adjacent cage pockets, e.g. guide means for the bearing-surface of the rollers}	33/581	. . . {integral with other parts, e.g. with housings or machine elements such as shafts or gear wheels}
33/4682	. . . . {of the end walls, e.g. interaction with the end faces of the rollers}	33/583	. . . {Details of specific parts of races}
33/4688	. . . {with rolling elements with smaller diameter than the load carrying rollers, e.g. cages with counter-rotating spacers}	33/585	. . . . {of raceways, e.g. ribs to guide the rollers}
33/4694	. . . {Single-split roller or needle cages}	33/586	. . . . {outside the space between the races, e.g. end faces or bore of inner ring}
33/48	. . . for multiple rows of rollers or needles	33/588	. . . {Races of sheet metal}
33/485	. . . . {with two or more juxtaposed cages joined together or interacting with each other}	33/60	. . . divided {or split, e.g. comprising two juxtaposed rings}
33/49	. . . comb-shaped	33/605	. . . . {with a separate retaining member, e.g. flange, shoulder, guide ring, secured to a race ring, adjacent to the race surface, so as to abut the end of the rolling elements, e.g. rollers, or the cage}
33/491	. . . . {applied as pairs for retaining both ends of the rollers or needles}	33/61	. . . . formed by wires
33/492	. . . . . {joined by rods}	33/62	. . . Selection of substances
33/494	. . . . {Massive or moulded comb cages}	33/64	. . . Special methods of manufacture
33/495	. . . . . {formed as one piece cages, i.e. monoblock comb cages}	33/66	. . Special parts or details in view of lubrication
33/497	. . . . . {made from metal, e.g. cast or machined comb cages}	33/6603	. . . {with grease as lubricant}
33/498	. . . . . {made from plastic, e.g. injection moulded comb cages}	33/6607	. . . . {Retaining the grease in or near the bearing}
33/50	. . . formed of interconnected members, e.g. chains	33/6611	. . . . . {in a porous or resinous body, e.g. a cage impregnated with the grease}
33/502	. . . . {formed of arcuate segments retaining one or more rollers or needles}	33/6614	. . . . . {in recesses or cavities provided in retainers, races or rolling elements}
33/504	. . . . . {with two segments, e.g. two semicircular cage parts}	33/6618	. . . . . {in a reservoir in the sealing means}
33/506	. . . . {formed as a flexible belt}	33/6622	. . . . {Details of supply and/or removal of the grease, e.g. purging grease}
33/508	. . . . {formed of links having an H-shape, i.e. links with a single stay placed between two rollers and with two end portions extending along the end faces of the two rollers}	33/6625	. . . . . {Controlling or conditioning the grease supply}
33/51	. . . formed of unconnected members	33/6629	. . . . {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements}
33/513	. . . . {formed of arcuate segments for carrying one or more rollers}	33/6633	. . . . {Grease properties or compositions, e.g. rheological properties}
33/516	. . . . . {with two segments, e.g. double-split cages with two semicircular parts}	33/6637	. . . {with liquid lubricant}
33/52	. . . with no part entering between, or touching, the bearing surfaces of the rollers (F16C 33/50 takes precedence)	33/664	. . . . {Retaining the liquid in or near the bearing}
33/523	. . . . {with pins extending into holes or bores on the axis of the rollers}	33/6644	. . . . . {by a magnetic field acting on a magnetic liquid}
33/526	. . . . . {extending through the rollers and joining two lateral cage parts}	33/6648	. . . . . {in a porous or resinous body, e.g. a cage impregnated with the liquid}
33/54	. . . made from wire, strips, or sheet metal (F16C 33/48 , F16C 33/49 take precedence)	33/6651	. . . . . {in recesses or cavities provided in retainers, races or rolling elements}
33/541	. . . . {Details of individual pockets, e.g. shape or roller retaining means}	33/6655	. . . . . {in a reservoir in the sealing means}
33/542	. . . . {made from sheet metal}	33/6659	. . . . {Details of supply of the liquid to the bearing, e.g. passages or nozzles}
33/543	. . . . . {from a single part}	33/6662	. . . . . {the liquid being carried by air or other gases, e.g. mist lubrication}
33/545	. . . . . {rolled from a band}	33/6666	. . . . . {from an oil bath in the bearing housing, e.g. by an oil ring or centrifugal disc}
33/546	. . . . . {with a M- or W-shaped cross section}	33/667	. . . . . {related to conditioning, e.g. cooling, filtering}
33/547	. . . . . {from two parts, e.g. two discs or rings joined together}	33/6674	. . . . . {related to the amount supplied, e.g. gaps to restrict flow of the liquid}
33/548	. . . . . {with more than three parts, e.g. two end rings connected by a plurality of stays or pins}	33/6677	. . . . . {from radial inside, e.g. via a passage through the shaft and/or inner ring}
33/56	. . . Selection of substances (F16C 33/48 , F16C 33/49 take precedence)	33/6681	. . . . {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements}
		33/6685	. . . . {Details of collecting or draining, e.g. returning the liquid to a sump}

- 33/6688 {Lubricant compositions or properties, e.g. viscosity}
- 33/6692 {Liquids other than oil, e.g. water, refrigerants, liquid metal}
- 33/6696 . . . {with solids as lubricant, e.g. dry coatings, powder}
- 33/72 . Sealings
- 33/723 . . {Shaft end sealing means, e.g. cup-shaped caps or covers}
- 33/726 . . {with means to vent the interior of the bearing}
- 33/74 . . of sliding-contact bearings
- 33/741 . . . {by means of a fluid}
- 33/743 {retained in the sealing gap}
- 33/745 {by capillary action}
- 33/746 {by a magnetic field}
- 33/748 {flowing to or from the sealing gap, e.g. vacuum seals with differential exhaust}
- 33/76 . . of ball or roller bearings
- 33/761 . . . {specifically for bearings with purely axial load}
- 33/762 . . . {by means of a fluid}
- 33/763 {retained in the sealing gap}
- 33/765 {by a magnetic field}
- 33/766 {by pumping action}
- 33/767 . . . {integral with the race}
- 33/768 . . . {between relatively stationary parts, i.e. static seals}
- 33/78 . . . with a diaphragm, disc, or ring, with or without resilient members [{\(F16C 33/761 takes precedence\)}](#)
- 33/7803 {suited for particular types of rolling bearings}
- 33/7806 {for spherical roller bearings}
- 33/7809 {for needle roller bearings}
- 33/7813 {for tapered roller bearings}
- 33/7816 {Details of the sealing or parts thereof, e.g. geometry, material}
- 33/782 {of the sealing region}
- 33/7823 {of sealing lips}
- 33/7826 {of the opposing surface cooperating with the seal, e.g. a shoulder surface of a bearing ring}
- 33/783 {of the mounting region}
- 33/7833 {Special methods of manufacture}
- 33/7836 {floating with respect to both races}
- 33/784 {mounted to a groove in the inner surface of the outer race and extending toward the inner race}
- 33/7843 {with a single annular sealing disc}
- 33/7846 {with a gap between the annular disc and the inner race}
- 33/785 {Bearing shields made of sheet metal}
- 33/7853 {with one or more sealing lips to contact the inner race}
- 33/7856 {with a single sealing lip}
- 33/7859 {with a further sealing element}
- 33/7863 {mounted to the inner race, e.g. a flinger to use centrifugal effect}
- 33/7866 {with sealing lips}
- 33/7869 {mounted with a cylindrical portion to the inner surface of the outer race and having a radial portion extending inward}
- 33/7873 {with a single sealing ring of generally L-shaped cross-section}
- 33/7876 {with sealing lips}
- 33/7879 {with a further sealing ring}
- 33/7883 {mounted to the inner race and of generally L-shape, the two sealing rings defining a sealing with box-shaped cross-section}
- 33/7886 {mounted outside the gap between the inner and outer races, e.g. sealing rings mounted to an end face or outer surface of a race}
- 33/7889 {mounted to an inner race and extending toward the outer race}
- 33/7893 {mounted to a cage or integral therewith}
- 33/7896 {with two or more discrete sealings arranged in series}
- 33/80 . . . Labyrinth sealings [{\(F16C 33/761 takes precedence\)}](#)
- 33/805 {in addition to other sealings, e.g. dirt guards to protect sealings with sealing lips}
- 33/82 . . . Arrangements for electrostatic or magnetic action against dust or other particles
- 35/00 Rigid support of bearing units; Housings, e.g. caps, covers [\(F16C 23/00 takes precedence\)](#)**
- 35/02 . . in the case of sliding-contact bearings
- 35/04 . . in the case of ball or roller bearings
- 35/042 . . . {Housings for rolling element bearings for rotary movement}
- 35/045 {with a radial flange to mount the housing}
- 35/047 {with a base plate substantially parallel to the axis of rotation, e.g. horizontally mounted pillow blocks}
- 35/06 . . Mounting {or dismounting} of ball or roller bearings; Fixing them onto shaft or in housing
- 35/061 . . . {mounting a plurality of bearings side by side}
- 35/062 . . . {Dismounting of ball or roller bearings}
- 35/063 . . . Fixing them on the shaft [\(with interposition of an element F16C 35/07\)](#)
- 35/0635 {the bore of the inner ring being of special non-cylindrical shape which co-operates with a complementary shape on the shaft, e.g. teeth, polygonal sections}
- 35/067 . . . Fixing them in a housing [\(with interposition of an element F16C 35/07\)](#)
- 35/07 . . . Fixing them on the shaft or housing with interposition of an element
- 35/073 between shaft and inner race ring
- 35/077 between housing and outer race ring
- 35/078 using pressure fluid as mounting aid
- 35/08 . . for spindles
- 35/10 . . with sliding-contact bearings
- 35/12 . . with ball or roller bearings [{\(adjustable bearings F16C 23/00, F16C 25/00; elastic bearings F16C 27/00\)}](#)
- 37/00 Cooling of bearings**
- 37/002 . . {of fluid bearings}
- 37/005 . . {of magnetic bearings}
- 37/007 . . {of rolling bearings}
- 39/00 Relieving load on bearings**
- 39/02 . . using mechanical means
- 39/04 . . using hydraulic or pneumatic means
- 39/06 . . using magnetic means

39/063	. . {Permanent magnets}	2202/70	. Anti-bacterial, anti-microbial
39/066	. . . {with opposing permanent magnets repelling each other}	2204/00	Metallic materials; Alloys (alloys in general C22C; F16C 2206/00 takes precedence)
41/00	Other accessories, {e.g. devices integrated in the bearing not relating to the bearing function as such}	2204/02	. Noble metals
41/001	. {Integrated brakes or clutches for stopping or coupling the relatively movable parts}	2204/04	. . based on silver
41/002	. {Conductive elements, e.g. to prevent static electricity}	2204/10	. Alloys based on copper
41/004	. {Electro-dynamic machines, e.g. motors, generators, actuators}	2204/12	. . with tin as the next major constituent
41/005	. {Fluid passages not relating to lubrication or cooling}	2204/14	. . with zinc as the next major constituent
41/007	. {Encoders, e.g. parts with a plurality of alternating magnetic poles}	2204/16	. . with lead as the next major constituent
41/008	. {Identification means, e.g. markings, RFID-tags; Data transfer means}	2204/18	. . with bismuth as the next major constituent
41/02	. Arrangements for equalising the load on a plurality of bearings or their elements	2204/20	. Alloys based on aluminium
41/04	. Preventing damage to bearings during storage or transport thereof or when otherwise out of use	2204/22	. . with tin as the next major constituent
41/045	. . {Devices for provisionally retaining needles or rollers in a bearing race before mounting of the bearing on a shaft}	2204/24	. . with lead as the next major constituent
43/00	Assembling bearings	2204/26	. Alloys based on magnesium
43/02	. Assembling sliding-contact bearings	2204/30	. Alloys based on one of tin, lead, antimony, bismuth, indium, e.g. materials for providing sliding surfaces
43/04	. Assembling rolling-contact bearings	2204/32	. . Alloys based on lead
43/045	. . {Mounting or replacing seals}	2204/34	. . Alloys based on tin
43/06	. . Placing rolling bodies in cages or bearings	2204/36	. . Alloys based on bismuth
43/065	. . . {in cages}	2204/40	. Alloys based on refractory metals
43/08	. . . by deforming the cages or the races	2204/42	. . Alloys based on titanium
43/083	. . . . {by plastic deformation of the cage}	2204/44	. . Alloys based on chromium
43/086	. . . . {by plastic deformation of the race}	2204/46	. . Alloys based on molybdenum
		2204/50	. Alloys based on zinc
		2204/52	. Alloys based on nickel, e.g. Inconel
		2204/60	. Ferrous alloys, e.g. steel alloys
		2204/62	. . Low carbon steel, i.e. carbon content below 0.4 wt%
		2204/64	. . Medium carbon steel, i.e. carbon content from 0.4 to 0,8 wt%
		2204/66	. . High carbon steel, i.e. carbon content above 0.8 wt%, e.g. through-hardenable steel
		2204/70	. . with chromium as the next major constituent
		2204/72	. . . with nickel as further constituent, e.g. stainless steel
		2204/74	. . with manganese as the next major constituent
		2204/80	. Amorphous alloys
2202/00	Solid materials defined by their properties	2206/00	Materials with ceramics, cermets, hard carbon or similar non-metallic hard materials as main constituents
2202/02	. Mechanical properties	2206/02	. Carbon based material
2202/04	. . Hardness	2206/04	. . Diamond like carbon [DLC]
2202/06	. . Strength or rigidity	2206/06	. . Composite carbon material, e.g. carbon fibre reinforced carbon (C/C)
2202/08	. . Resilience, elasticity, super-elasticity	2206/40	. Ceramics, e.g. carbides, nitrides, oxides, borides of a metal
2202/10	. . Porosity	2206/42	. . based on ceramic oxides
2202/20	. Thermal properties	2206/44	. . . based on aluminium oxide (Al ₂ O ₃)
2202/22	. . Coefficient of expansion	2206/48	. . . based on zirconia (ZrO ₂)
2202/24	. . Insulating	2206/56	. . based on ceramic carbides, e.g. silicon carbide (SiC)
2202/28	. . Shape memory material	2206/58	. . based on ceramic nitrides
2202/30	. Electric properties; Magnetic properties	2206/60	. . . Silicon nitride (Si ₃ N ₄)l
2202/32	. . Conductivity	2206/80	. Cermets, i.e. composites of ceramics and metal (in general C22C 29/00)
2202/34	. . . Superconductivity	2206/82	. . based on tungsten carbide [WC]
2202/36	. . Piezo-electric	2208/00	Plastics; Synthetic resins, e.g. rubbers
2202/40	. . Magnetic (magnetic material in general H01F 1/00)	2208/02	. comprising fillers, fibres
2202/42	. . . soft-magnetic, ferromagnetic	2208/04	. . Glass fibres
2202/44	. . . hard-magnetic, permanent magnetic, e.g. samarium-cobalt	2208/10	. Elastomers; Rubbers
2202/50	. Lubricating properties	2208/12	. . Polyurethan [PU]
2202/52	. . Graphite		
2202/54	. . Molybdenum disulfide		
2202/60	. Oil repelling		
2202/64	. Water absorbing		
2202/66	. Water repelling		

- 2208/14 . . Silicone rubber
- 2208/20 . Thermoplastic resins
- 2208/22 . . comprising two or more thermoplastics
- 2208/30 . . Fluoropolymers ([F16C 2208/58 takes precedence](#))
- 2208/32 . . . Polytetrafluoroethylene [PTFE] ([F16C 2208/58 takes precedence](#))
- 2208/34 . . . Polyvinylidene fluoride [PVDF] ([F16C 2208/58 takes precedence](#))
- 2208/36 . . Polyarylene ether ketones [PAEK], e.g. PEK, PEEK ([F16C 2208/58 takes precedence](#))
- 2208/40 . . Imides, e.g. polyimide [PI], polyetherimide [PEI] ([F16C 2208/58 takes precedence](#))
- 2208/42 . . . Polyamideimide [PAI] ([F16C 2208/58 takes precedence](#))
- 2208/44 . . . Polybenzimidazole [PBI] ([F16C 2208/58 takes precedence](#))
- 2208/48 . . Liquid crystal polymers [LCP] ([F16C 2208/58 takes precedence](#))
- 2208/52 . . Polyphenylene sulphide [PPS] ([F16C 2208/58 takes precedence](#))
- 2208/54 . . Polysulphones, e.g. polysulphone [PSU], polyethersulphone [PES], polyethersulphone-block copolymer [PPSU] ([F16C 2208/58 takes precedence](#))
- 2208/58 . . Several materials as provided for in [F16C 2208/30](#) - [F16C 2208/54](#) mentioned as option
- 2208/60 . . Polyamides [PA]
- 2208/62 . . . high performance polyamides, e.g. PA12, PA46
- 2208/66 . . Acetals, e.g. polyoxymethylene [POM]
- 2208/70 . . Polyesters, e.g. polyethylene-terephthalate [PET], polybutylene-terephthalate [PBT]
- 2208/72 . . Acrylics, e.g. polymethylmethacrylate [PMMA]
- 2208/76 . . Polyolefins, e.g. polypropylene [PP]
- 2208/78 . . . Polyethylene [PE], e.g. ultra-high molecular weight polyethylene [UHMWPE]
- 2208/80 . Thermosetting resins
- 2208/82 . . Composites, i.e. fibre reinforced thermosetting resins
- 2208/86 . . Epoxy resins
- 2208/90 . . Phenolic resin
- 2210/00 Fluids**
- 2210/02 . defined by their properties
- 2210/04 . . by viscosity
- 2210/06 . . magnetic fluids
- 2210/08 . molten metals
- 2210/10 . water based
- 2212/00 Natural materials, i.e. based on animal or plant products such as leather, wood or cotton or extracted therefrom, e.g. lignin**
- 2212/04 . Wood
- 2212/08 . Woven, unwoven fabrics, e.g. felt
- 2220/00 Shaping**
- 2220/02 . by casting ([in general B22D](#); for plastics [B29C 39/00](#))
- 2220/04 . . by injection-moulding ([of plastics in general B29C 45/00](#))
- 2220/06 . . [in situ](#) casting or moulding
- 2220/08 . . by compression-moulding
- 2220/20 . by sintering pulverised material, e.g. powder metallurgy ([in general B22F](#))
- 2220/24 . by built-up welding ([in general B23K 9/04](#))
- 2220/28 . by winding impregnated fibres ([in general B29C 70/00](#))
- 2220/40 . by deformation without removing material
- 2220/42 . . by working of thin walled material such as sheet or tube ([in general B21D](#))
- 2220/44 . . by rolling ([in general B21H](#))
- 2220/46 . . by forging ([in general B21J](#))
- 2220/48 . . by extrusion, e.g. of metallic profiles ([in general B21C 23/00](#))
- 2220/60 . by removing material, e.g. machining
- 2220/62 . . by turning, boring, drilling ([in general B23B](#))
- 2220/66 . . by milling ([in general B23C](#))
- 2220/68 . . by electrical discharge or electrochemical machining ([in general B23H](#))
- 2220/70 . . by grinding ([in general B24B](#))
- 2220/80 . by separating parts, e.g. by severing, cracking
- 2220/82 . . by cutting ([in general B26D](#))
- 2220/84 . . by perforating; by punching; by stamping-out ([in general B26F](#))
- 2223/00 Surface treatments; Hardening; Coating**
- 2223/02 . Mechanical treatment, e.g. finishing
- 2223/04 . . by sizing, by shaping to final size by small plastic deformation, e.g. by calibrating or coining ([in general B23P 9/00](#))
- 2223/06 . . polishing ([in general B24B 29/00](#), [B24B 31/00](#))
- 2223/08 . . shot-peening, blasting ([in general B24C](#))
- 2223/10 . Hardening, e.g. carburizing, carbo-nitriding ([in general C21D](#), [C23C 8/00](#))
- 2223/12 . . with carburizing
- 2223/14 . . with nitriding
- 2223/16 . . with carbo-nitriding
- 2223/18 . . with induction hardening
- 2223/30 . Coating surfaces ([in general B05C](#), [C23C](#))
- 2223/32 . . by attaching pre-existing layers, e.g. resin sheets or foils by adhesion to a substrate; Laminating ([in general B32B](#))
- 2223/40 . . by dipping in molten material ([in general C23C 2/00](#))
- 2223/42 . . by spraying the coating material, e.g. plasma spraying ([in general C23C 4/00](#))
- 2223/44 . . by casting molten material on the substrate ([in general C23C 6/00](#))
- 2223/46 . . by welding, e.g. by using a laser to build a layer ([in general B23K 9/04](#))
- 2223/60 . . by vapour deposition, e.g. PVD, CVD ([in general C23C 14/00](#))
- 2223/70 . . by electroplating or electrolytic coating, e.g. anodising, galvanising ([in general C25D](#))
- 2223/80 . . by powder coating ([in general B22F 7/00](#))
- 2226/00 Joining parts; Fastening; Assembling or mounting parts (fasteners, securing, joints in general F16B)**
- 2226/10 . Force connections, e.g. clamping ([shrinkage connections, force fits, friction grips in general F16B 4/00](#), for rigidly connecting coaxial parts [F16D 1/00](#))
- 2226/12 . . by press-fit, e.g. plug-in
- 2226/14 . . by shrink fit, i.e. heating and shrinking part to allow assembly ([for metal parts in general B23P 11/02](#))
- 2226/16 . . by wedge action, e.g. by tapered or conical parts

- 2226/18 . . by magnets, i.e. magnetic attraction to hold parts together
- 2226/30 . Material joints ([in general B23K](#))
- 2226/32 . . by soldering
- 2226/34 . . . by brazing
- 2226/36 . . by welding
- 2226/38 . . . with ultrasonic welding
- 2226/40 . . with adhesive
- 2226/50 . Positive connections
- 2226/52 . . with plastic deformation, e.g. caulking or staking
- 2226/54 . . . with rivets ([in general F16B 19/00](#))
- 2226/60 . . with threaded parts, e.g. bolt and nut connections ([in general F16B 23/00 - F16B 43/00](#))
- 2226/62 . . with pins, bolts or dowels
- 2226/70 . . with complementary interlocking parts
- 2226/72 . . . with bayonet joints, i.e. parts are rotated to create positive interlock
- 2226/74 . . . with snap-fit, e.g. by clips
- 2226/76 . . . with tongue and groove or key and slot
- 2226/78 of jigsaw-puzzle type
- 2226/80 . . with splines, serrations or similar profiles to prevent movement between joined parts
- 2229/00** **Setting preload**
- 2231/00** **Running-in; Initial operation**
- 2233/00** **Monitoring condition, e.g. temperature, load, vibration**
- 2235/00** **Cleaning**
- 2237/00** **Repair or replacement**
- 2240/00** **Specified values or numerical ranges of parameters; Relations between them ([properties of materials F16C 2202/00](#))**
- 2240/02 . Flow, e.g. volume flow or mass flow
- 2240/06 . Temperature
- 2240/08 . Time
- 2240/12 . Force, load, stress, pressure
- 2240/14 . . Preload
- 2240/18 . . Stress
- 2240/22 . . Fluid pressure
- 2240/26 . Speed, e.g. rotational speed
- 2240/30 . Angles, e.g. inclinations
- 2240/34 . . Contact angles
- 2240/40 . Linear dimensions, e.g. length, radius, thickness, gap
- 2240/42 . . Groove sizes
- 2240/44 . . Hole or pocket sizes
- 2240/46 . . Gap sizes or clearances
- 2240/48 . . Particle sizes
- 2240/50 . . Crowning, e.g. crowning height or crowning radius
- 2240/54 . . Surface roughness
- 2240/56 . . Tolerances; Accuracy of linear dimensions
- 2240/60 . . Thickness, e.g. thickness of coatings
- 2240/64 . . . in the nanometer range
- 2240/70 . . Diameters; Radii
- 2240/76 . . . Osculation, i.e. relation between radii of balls and raceway groove
- 2240/80 . . . Pitch circle diameters [PCD]
- 2240/82 Degree of filling, i.e. sum of diameters of rolling elements in relation to PCD
- 2240/84 with full complement of balls or rollers, i.e. sum of clearances less than diameter of one rolling element
- 2240/90 . Surface areas
- 2240/94 . Volume
- 2300/00** **Application independent of particular apparatuses**
- 2300/02 . General use or purpose, i.e. no use, purpose, special adaptation or modification indicated or a wide variety of uses mentioned
- 2300/10 . related to size
- 2300/12 . . Small applications, e.g. miniature bearings
- 2300/14 . . Large applications, e.g. bearings having an inner diameter exceeding 500 mm
- 2300/20 . related to type of movement
- 2300/22 . . High-speed rotation
- 2300/28 . . Reciprocating movement
- 2300/30 . related to direction with respect to gravity
- 2300/32 . . Horizontal, e.g. bearings for supporting a horizontal shaft
- 2300/34 . . Vertical, e.g. bearings for supporting a vertical shaft
- 2300/40 . related to environment, i.e. operating conditions
- 2300/42 . . corrosive, i.e. with aggressive media or harsh conditions
- 2300/52 . . low temperature, e.g. cryogenic temperature
- 2300/54 . . high-temperature
- 2300/62 . . low pressure, e.g. elements operating under vacuum conditions
- 2300/64 . . high pressure, e.g. elements exposed to high pressure gases or fluids
- 2310/00** **Agricultural machines ([in general A01](#))**
- 2314/00** **Personal or domestic articles, e.g. household appliances such as washing machines, dryers ([in general A41 - A47](#))**
- 2314/70 . Furniture
- 2314/72 . . Drawers
- 2314/73 . . Chairs
- 2316/00** **Apparatus in health or amusement ([in general A61 - A63](#))**
- 2316/10 . in medical appliances, e.g. in diagnosis, dentistry, instruments, prostheses, medical imaging appliances
- 2316/13 . . Dental machines
- 2316/18 . . Pumps for pumping blood
- 2316/30 . Articles for sports, games and amusement, e.g. roller skates, toys
- 2320/00** **Apparatus used in separating or mixing ([in general B01 - B09](#))**
- 2320/16 . Mixing apparatus
- 2320/23 . Milling apparatus ([in general B02C](#))
- 2320/42 . Centrifuges ([in general B04B](#))
- 2322/00** **Apparatus used in shaping articles ([in general B21 - B32](#))**
- 2322/12 . Rolling apparatus, e.g. rolling stands, rolls
- 2322/14 . Stamping, deep-drawing or punching, e.g. die sets
- 2322/34 . Sawing machines ([in general B23D](#))
- 2322/39 . General build up of machine tools, e.g. spindles, slides, actuators ([in general B23Q](#))
- 2322/50 . Hand tools, workshop equipment or manipulators ([in general B25](#))

- 2322/59 . . Manipulators, e.g. robot arms ([in general B25J](#))
- 2324/00 Apparatus used in printing ([in general B41 - B44](#))**
- 2324/16 . Printing machines ([in general B41F](#))
- 2326/00 Articles relating to transporting ([in general B60 - B68](#))**
- 2326/01 . Parts of vehicles in general ([engines F16C 2360/00](#))
- 2326/02 . . Wheel hubs or castors ([in general B60B](#))
- 2326/05 . . Vehicle suspensions, e.g. bearings, pivots or connecting rods used therein ([in general B60G](#))
- 2326/06 . . Drive shafts ([in general B60K](#))
- 2326/08 . . Vehicle seats, e.g. in linear movable seats ([in general B60N](#))
- 2326/09 . . Windscreen wipers, e.g. pivots therefore ([in general B60S](#))
- 2326/10 . Railway vehicles ([in general B61](#))
- 2326/20 . Land vehicles ([in general B62](#))
- 2326/24 . . Steering systems, e.g. steering rods or columns ([in general B62D](#))
- 2326/26 . . Bicycle steering or suspension ([in general B62K](#))
- 2326/28 . . Bicycle propulsion, e.g. crankshaft and its support ([in general B62M](#))
- 2326/30 . Ships, e.g. propelling shafts and bearings therefor ([in general B63H](#))
- 2326/43 . Aeroplanes; Helicopters ([in general B64C](#))
- 2326/47 . Cosmonautic vehicles, i.e. bearings adapted for use in outer-space ([in general B64G](#))
- 2326/58 . Conveyor systems, e.g. rollers or bearings therefor ([in general B65G](#))
- 2340/00 Apparatus for treating textiles ([in general D01 - D07](#))**
- 2340/18 . Apparatus for spinning or twisting ([in general D01H](#))
- 2340/24 . Godet rolls ([in general D02](#))
- 2350/00 Machines or articles related to building ([in general E01 - E06](#))**
- 2350/26 . Excavators ([in general E02F](#))
- 2350/52 . Locks, e.g. cables to actuate door locks ([in general E05B](#))
- 2350/54 . Hinges, e.g. sliding bearings for hinges ([in general E05D](#))
- 2352/00 Apparatus for drilling ([in general E21](#))**
- 2360/00 Engines or pumps ([in general F01 - F04](#))**
- 2360/18 . Camshafts ([in general F01L](#))
- 2360/22 . Internal combustion engines ([in general F02B](#))
- 2360/23 . Gas turbine engines ([in general F02C](#))
- 2360/24 . . Turbochargers ([in general F02C 6/12](#))
- 2360/31 . Wind motors ([in general F03D](#))
- 2360/42 . Pumps with cylinders or pistons ([in general F04B](#))
- 2360/43 . Screw compressors ([in general F04C](#))
- 2360/44 . Centrifugal pumps ([in general F04D](#))
- 2360/45 . . Turbo-molecular pumps ([in general F04D 19/04](#))
- 2360/46 . Fans, e.g. ventilators
- 2361/00 Apparatus or articles in engineering in general ([F15 - F17](#))**
- 2361/31 . Axle
- 2361/41 . Couplings ([in general F16D 3/00](#))
- 2361/43 . Clutches, e.g. disengaging bearing ([in general F16D 11/00 - F16D 47/00](#))
- 2361/45 . Brakes ([in general B60T, F16D 49/00 - F16D 65/00](#))
- 2361/53 . Spring-damper, e.g. gas springs ([in general F16F 9/00](#))
- 2361/55 . Flywheel systems ([in general F16F 15/00](#))
- 2361/61 . Toothed gear systems, e.g. support of pinion shafts ([in general F16H 57/02](#))
- 2361/63 . Gears with belts and pulleys
- 2361/65 . Gear shifting, change speed gear, gear box
- 2361/71 . Chains ([in general F16G](#))
- 2361/91 . Valves
- 2362/00 Apparatus for lighting or heating ([in general F21 - F28](#))**
- 2362/40 . Ovens or other heatings ([in general F24](#))
- 2362/52 . Compressors of refrigerators, e.g. air-conditioners ([in general F25](#))
- 2370/00 Apparatus relating to physics, e.g. instruments ([in general G01 - G12](#))**
- 2370/12 . Hard disk drives or the like
- 2370/20 . Optical, e.g. movable lenses or mirrors; Spectacles ([in general G02](#))
- 2370/22 . . Polygon mirror
- 2370/38 . Electrographic apparatus ([in general G03G](#))
- 2380/00 Electrical apparatus ([in general H01 - H05](#))**
- 2380/16 . X-ray tubes ([in general H01J 35/00](#))
- 2380/18 . Handling tools for semiconductor devices
- 2380/26 . Dynamo-electric machines or combinations therewith, e.g. electro-motors and generators ([in general H02K](#))
- 2380/27 . . Motor coupled with a gear, e.g. worm gears
- 2380/28 . . Motor, generator coupled with a flywheel