

# 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:
 

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

<b>1/00</b>	<b>Flexible shafts (flexible shafts in dental machines for boring or cutting <a href="#">A61C 1/18</a>); Mechanical means for transmitting movement in a flexible sheathing</b>	<b>1/106</b>	. . {Plurality of transmitting means, e.g. two or more parallel "Bowden cables"}
<b>1/02</b>	. for conveying rotary movements	<b>1/107</b>	. . {Sealing details}
<b>1/04</b>	. . Articulated shafts	<b>1/108</b>	. . {Reducing or controlling of vibrations, e.g. by resilient damping of noise}
<b>1/06</b>	. . with guiding sheathing, tube or box ( <a href="#">F16C 1/04</a> takes precedence; guiding sheathings <a href="#">F16C 1/26</a> )	<b>1/12</b>	. . Arrangements for transmitting movement to or from the flexible member
<b>1/08</b>	. . End connections	<b>1/14</b>	. . . Construction of the end-piece of the flexible member; Attachment thereof to the flexible member
<b>1/10</b>	. Means for transmitting linear movement in a flexible sheathing, e.g. "Bowden-mechanisms" ( <a href="#">guiding-sheathings F16C 1/26</a> )	<b>1/145</b>	. . . . {Attachment of the end-piece to the flexible member}
<b>1/101</b>	. . {Intermediate connectors for joining portions of split flexible shafts and/or sheathings}	<b>1/16</b>	. . . in which the end-piece is guided rectilinearly
<b>1/102</b>	. . {Arrangements to mount end fittings of the sheathings to support walls or brackets}	<b>1/18</b>	. . . in which the end portion of the flexible member is laid along a curved surface of a pivoted member
<b>1/103</b>	. . . {to a hole in the wall or bracket}		
<b>1/105</b>	. . . {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](#)); **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}	19/502	. . {with rolling elements in rows not forming a full circle}
19/166	. . . . . {Four-point-contact ball bearings}	19/505	. . {with the diameter of the rolling elements of one row differing from the diameter of those of another row}
19/18	. . . with two or more rows of balls	19/507	. . {with rolling elements journaled in one of the moving parts, e.g. stationary rollers to support a rotating part}
19/181	. . . . . {with angular contact}	19/52	. with devices affected by abnormal or undesired conditions
19/182	. . . . . {in tandem arrangement}	19/522	. . {related to load on the bearing, e.g. bearings with load sensors or means to protect the bearing against overload}
19/183	. . . . . {with two rows at opposite angles}	19/525	. . {related to temperature and heat, e.g. insulation}
19/184	. . . . . {in O-arrangement}	19/527	. . {related to vibration and noise}
19/185	. . . . . {with two raceways provided integrally on a part other than a race ring, e.g. a shaft or housing}	19/54	. Systems consisting of a plurality of bearings with rolling friction ( <a href="#">spindle bearings F16C 35/08</a> )
19/186	. . . . . {with three raceways provided integrally on parts other than race rings, e.g. third generation hubs}	19/541	. . {Systems consisting of juxtaposed rolling bearings including at least one angular contact bearing}
19/187	. . . . . {with all four raceways integrated on parts other than race rings, e.g. fourth generation hubs}	19/542	. . . {with two rolling bearings with angular contact}
19/188	. . . . {with at least one row for radial load in combination with at least one row for axial load}	19/543	. . . . {in O-arrangement}
19/20	. . with loose spacing bodies, e.g. balls, between the bearing balls	19/545	. . {Systems comprising at least one rolling bearing for radial load in combination with at least one rolling bearing for axial load}
19/22	. with bearing rollers essentially of the same size in one or more circular rows, e.g. needle bearings	19/546	. . {Systems with spaced apart rolling bearings including at least one angular contact bearing}
19/225	. . {Details of the ribs supporting the end of the rollers}	19/547	. . . {with two angular contact rolling bearings}
19/24	. . for radial load mainly	19/548	. . . . {in O-arrangement}
19/26	. . . with a single row of rollers	19/55	. . with intermediate floating {or independently-driven} rings rotating at reduced speed {or with other differential ball or roller bearings}
19/28	. . . with two or more rows of rollers	19/56	. . in which the rolling bodies of one bearing differ in diameter from those of another
19/30	. . for axial load mainly		
19/305	. . . {consisting of rollers held in a cage}	<b>21/00</b>	<b>Combinations of sliding-contact bearings with ball or roller bearings, for exclusively rotary movement (<a href="#">F16C 17/24</a>, <a href="#">F16C 19/52</a> take precedence)</b>
19/32	. . . for supporting the end face of a shaft or other member, e.g. footstep bearings	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 ( <a href="#">seals F16C 33/72</a> , <a href="#">F16D 3/38</a> )}
19/34	. . for both radial and axial load		
19/36	. . . with a single row of rollers	<b>23/00</b>	<b>Bearings for exclusively rotary movement adjustable for aligning or positioning (<a href="#">F16C 27/00</a> takes precedence ; hydrostatic bearings <a href="#">F16C 32/067</a>)</b>
19/361	. . . . {with cylindrical rollers}	23/02	. Sliding-contact bearings
19/362	. . . . . {the rollers being crossed within the single row}	23/04	. . self-adjusting
19/364	. . . . {with tapered rollers, i.e. rollers having essentially the shape of a truncated cone}	23/041	. . . {with edge relief}
19/38	. . . with two or more rows of rollers	23/043	. . . {with spherical surfaces, e.g. spherical plain bearings}
19/381	. . . . {with at least one row for radial load in combination with at least one row for axial load}	23/045	. . . . {for radial load mainly, e.g. radial spherical plain bearings}
19/383	. . . . {with tapered rollers, i.e. rollers having essentially the shape of a truncated cone}	23/046	. . . . . {with split outer rings}
19/385	. . . . . {with two rows, i.e. double-row tapered roller bearings}	23/048	. . . . . {for axial load mainly}
19/386	. . . . . {in O-arrangement}	23/06	. Ball or roller bearings
19/388	. . . . . {with four rows, i.e. four row tapered roller bearings}	23/08	. . self-adjusting
19/40	. . with loose spacing bodies between the rollers	23/082	. . . {by means of at least one substantially spherical surface}
19/44	. . Needle bearings	23/084	. . . . {sliding on a complementary spherical surface}
19/46	. . . with one row or needles	23/086	. . . . . {forming a track for rolling elements}
19/463	. . . . {consisting of needle rollers held in a cage, i.e. subunit without race rings}	23/088	. . . . {by means of crowning}
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		



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}
<b>25/00</b>	<b>Bearings for exclusively rotary movement adjustable for wear or play (F16C 27/00 takes precedence)</b>	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}
<b>27/00</b>	<b>Elastic or yielding bearings or bearing supports, for exclusively rotary movement (shock-damping bearings for watches or clocks G04B 31/02)</b>	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}
<b>{Other bearings}</b>		29/0642	• • • • • {with four rows of balls}
<b>29/00</b>	<b>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})</b>	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 <a href="#">F16C 3/035</a> ; yielding coupling allowing axial displacement by rolling elements <a href="#">F16D 3/065</a> )}	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 <a href="#">F16C 3/035</a> ; yielding coupling allowing axial displacement by rolling elements <a href="#">F16D 3/065</a> )}	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 <a href="#">B23Q 11/08</a> )}	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}
<b>31/00</b>	<b>Bearings for parts which both rotate and move linearly</b>	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}
<b>32/00</b>	<b>Bearings not otherwise provided for</b>	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 <u>per se</u> }
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**

<b>33/00</b>	<b>Parts of bearings; Special methods for making bearings or parts thereof</b>
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}

33/127	. . . . . {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}	33/4664	. . . . . {with more than three parts, e.g. two end rings connected by individual stays}
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}		
33/3843	. . . . . {formed as one-piece cages, i.e. monoblock cages}		



33/467	. . . {Details of individual pockets, e.g. shape or roller retaining means}	33/581	. . . {integral with other parts, e.g. with housings or machine elements such as shafts or gear wheels}
33/4676	. . . . {of the stays separating adjacent cage pockets, e.g. guide means for the bearing-surface of the rollers}	33/583	. . . {Details of specific parts of races}
33/4682	. . . . {of the end walls, e.g. interaction with the end faces of the rollers}	33/585	. . . . {of raceways, e.g. ribs to guide the rollers}
33/4688	. . . {with rolling elements with smaller diameter than the load carrying rollers, e.g. cages with counter-rotating spacers}	33/586	. . . . {outside the space between the races, e.g. end faces or bore of inner ring}
33/4694	. . . {Single-split roller or needle cages}	33/588	. . . {Races of sheet metal}
33/48	. . . for multiple rows of rollers or needles	33/60	. . . divided {or split, e.g. comprising two juxtaposed rings}
33/485	. . . . {with two or more juxtaposed cages joined together or interacting with each other}	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}
33/49	. . . comb-shaped	33/61	. . . . formed by wires
33/491	. . . . {applied as pairs for retaining both ends of the rollers or needles}	33/62	. . . Selection of substances
33/492	. . . . . {joined by rods}	33/64	. . . Special methods of manufacture
33/494	. . . . {Massive or moulded comb cages}	33/66	. . Special parts or details in view of lubrication
33/495	. . . . . {formed as one piece cages, i.e. monoblock comb cages}	33/6603	. . . {with grease as lubricant}
33/497	. . . . . {made from metal, e.g. cast or machined comb cages}	33/6607	. . . . {Retaining the grease in or near the bearing}
33/498	. . . . . {made from plastic, e.g. injection moulded comb cages}	33/6611	. . . . . {in a porous or resinous body, e.g. a cage impregnated with the grease}
33/50	. . . formed of interconnected members, e.g. chains	33/6614	. . . . . {in recesses or cavities provided in retainers, races or rolling elements}
33/502	. . . . {formed of arcuate segments retaining one or more rollers or needles}	33/6618	. . . . . {in a reservoir in the sealing means}
33/504	. . . . . {with two segments, e.g. two semicircular cage parts}	33/6622	. . . . {Details of supply and/or removal of the grease, e.g. purging grease}
33/506	. . . . {formed as a flexible belt}	33/6625	. . . . . {Controlling or conditioning the grease supply}
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}	33/6629	. . . . {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements}
33/51	. . . formed of unconnected members	33/6633	. . . . {Grease properties or compositions, e.g. rheological properties}
33/513	. . . . {formed of arcuate segments for carrying one or more rollers}	33/6637	. . . {with liquid lubricant}
33/516	. . . . . {with two segments, e.g. double-split cages with two semicircular parts}	33/664	. . . . {Retaining the liquid in or near the bearing}
33/52	. . . with no part entering between, or touching, the bearing surfaces of the rollers ( <a href="#">F16C 33/50 takes precedence</a> )	33/6644	. . . . . {by a magnetic field acting on a magnetic liquid}
33/523	. . . . {with pins extending into holes or bores on the axis of the rollers}	33/6648	. . . . . {in a porous or resinous body, e.g. a cage impregnated with the liquid}
33/526	. . . . . {extending through the rollers and joining two lateral cage parts}	33/6651	. . . . . {in recesses or cavities provided in retainers, races or rolling elements}
33/54	. . . made from wire, strips, or sheet metal ( <a href="#">F16C 33/48</a> , <a href="#">F16C 33/49 take precedence</a> )	33/6655	. . . . . {in a reservoir in the sealing means}
33/541	. . . . {Details of individual pockets, e.g. shape or roller retaining means}	33/6659	. . . . {Details of supply of the liquid to the bearing, e.g. passages or nozzles}
33/542	. . . . {made from sheet metal}	33/6662	. . . . . {the liquid being carried by air or other gases, e.g. mist lubrication}
33/543	. . . . . {from a single part}	33/6666	. . . . . {from an oil bath in the bearing housing, e.g. by an oil ring or centrifugal disc}
33/545	. . . . . {rolled from a band}	33/667	. . . . . {related to conditioning, e.g. cooling, filtering}
33/546	. . . . . {with a M- or W-shaped cross section}	33/6674	. . . . . {related to the amount supplied, e.g. gaps to restrict flow of the liquid}
33/547	. . . . . {from two parts, e.g. two discs or rings joined together}	33/6677	. . . . . {from radial inside, e.g. via a passage through the shaft and/or inner ring}
33/548	. . . . . {with more than three parts, e.g. two end rings connected by a plurality of stays or pins}	33/6681	. . . . {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements}
33/56	. . . Selection of substances ( <a href="#">F16C 33/48</a> , <a href="#">F16C 33/49 take precedence</a> )	33/6685	. . . . {Details of collecting or draining, e.g. returning the liquid to a sump}
33/565	. . . . {Coatings}	33/6688	. . . . {Lubricant compositions or properties, e.g. viscosity}
33/58	. . Raceways; Race rings		

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

39/066	. . . {with opposing permanent magnets repelling each other}	2204/00	<b>Metallic materials; Alloys (alloys in general C22C; F16C 2206/00 takes precedence)</b>
41/00	<b>Other accessories, {e.g. devices integrated in the bearing not relating to the bearing function as such}</b>	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	<b>Assembling bearings</b>	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
<hr/>		2204/50	. Alloys based on zinc
2202/00	<b>Solid materials defined by their properties</b>	2204/52	. Alloys based on nickel, e.g. Inconel
2202/02	. Mechanical properties	2204/60	. Ferrous alloys, e.g. steel alloys
2202/04	. . Hardness	2204/62	. . Low carbon steel, i.e. carbon content below 0.4 wt%
2202/06	. . Strength or rigidity	2204/64	. . Medium carbon steel, i.e. carbon content from 0.4 to 0,8 wt%
2202/08	. . Resilience, elasticity, super-elasticity	2204/66	. . High carbon steel, i.e. carbon content above 0.8 wt%, e.g. through-hardenable steel
2202/10	. . Porosity	2204/70	. . with chromium as the next major constituent
2202/20	. Thermal properties	2204/72	. . . with nickel as further constituent, e.g. stainless steel
2202/22	. . Coefficient of expansion	2204/74	. . with manganese as the next major constituent
2202/24	. . Insulating	2204/80	. Amorphous alloys
2202/28	. . Shape memory material	2206/00	<b>Materials with ceramics, cermets, hard carbon or similar non-metallic hard materials as main constituents</b>
2202/30	. Electric properties; Magnetic properties	2206/02	. Carbon based material
2202/32	. . Conductivity	2206/04	. . Diamond like carbon [DLC]
2202/34	. . . Superconductivity	2206/06	. . Composite carbon material, e.g. carbon fibre reinforced carbon (C/C)
2202/36	. . Piezoelectric	2206/40	. Ceramics, e.g. carbides, nitrides, oxides, borides of a metal
2202/40	. . Magnetic	2206/42	. . based on ceramic oxides
2202/42	. . . soft-magnetic, ferromagnetic	2206/44	. . . based on aluminium oxide (Al <sub>2</sub> O <sub>3</sub> )
2202/44	. . . hard-magnetic, permanent magnetic, e.g. samarium-cobalt	2206/48	. . . based on zirconia (ZrO <sub>2</sub> )
2202/50	. Lubricating properties	2206/56	. . based on ceramic carbides, e.g. silicon carbide (SiC)
2202/52	. . Graphite	2206/58	. . based on ceramic nitrides
2202/54	. . Molybdenum disulfide	2206/60	. . . Silicon nitride (Si <sub>3</sub> N <sub>4</sub> )l
2202/60	. Oil repelling	2206/80	. Cermets, i.e. composites of ceramics and metal
2202/64	. Water absorbing	2206/82	. . based on tungsten carbide [WC]
2202/66	. Water repelling	2208/00	<b>Plastics; Synthetic resins, e.g. rubbers</b>
2202/70	. Anti-bacterial, anti-microbial	2208/02	. comprising fillers, fibres
		2208/04	. . Glass fibres
		2208/10	. Elastomers; Rubbers
		2208/12	. . Polyurethan [PU]
		2208/14	. . Silicone rubber
		2208/20	. Thermoplastic resins

2208/22	. . comprising two or more thermoplastics	2220/42	. . by working of thin-walled material such as sheet or tube
2208/30	. . Fluoropolymers ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/44	. . by rolling
2208/32	. . . Polytetrafluorethylene [PTFE] ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/46	. . by forging
2208/34	. . . Polyvinylidene fluoride [PVDF] ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/48	. . by extrusion, e.g. of metallic profiles
2208/36	. . Polyarylene ether ketones [PAEK], e.g. PEK, PEEK ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/60	. by removing material, e.g. machining
2208/40	. . Imides, e.g. polyimide [PI], polyetherimide [PEI] ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/62	. . by turning, boring, drilling
2208/42	. . . Polyamideimide [PAI] ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/66	. . by milling
2208/44	. . . Polybenzimidazole [PBI] ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/68	. . by electrical discharge or electrochemical machining
2208/48	. . Liquid crystal polymers [LCP] ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/70	. . by grinding
2208/52	. . Polyphenylene sulphide [PPS] ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/80	. by separating parts, e.g. by severing, cracking
2208/54	. . Polysulphones, e.g. polysulphone [PSU], polyethersulphone [PES], polyethersulphone-block copolymer [PPSU] ( <a href="#">F16C 2208/58 takes precedence</a> )	2220/82	. . by cutting
2208/58	. . Several materials as provided for in <a href="#">F16C 2208/30</a> - <a href="#">F16C 2208/54</a> mentioned as option	2220/84	. . by perforating; by punching; by stamping-out
2208/60	. . Polyamides [PA]	<b>2223/00</b>	<b>Surface treatments; Hardening; Coating</b>
2208/62	. . . high performance polyamides, e.g. PA12, PA46	2223/02	. Mechanical treatment, e.g. finishing
2208/66	. . Acetals, e.g. polyoxymethylene [POM]	2223/04	. . by sizing, by shaping to final size by small plastic deformation, e.g. by calibrating or coining
2208/70	. . Polyesters, e.g. polyethylene-terephthalate [PET], polybutylene-terephthalate [PBT]	2223/06	. . polishing
2208/72	. . Acrylics, e.g. polymethylmethacrylate [PMMA]	2223/08	. . shot-peening, blasting
2208/76	. . Polyolefins, e.g. polypropylene [PP]	2223/10	. Hardening, e.g. carburizing, carbo-nitriding
2208/78	. . . Polyethylene [PE], e.g. ultra-high molecular weight polyethylene [UHMWPE]	2223/12	. . with carburizing
2208/80	. Thermosetting resins	2223/14	. . with nitriding
2208/82	. . Composites, i.e. fibre reinforced thermosetting resins	2223/16	. . with carbo-nitriding
2208/86	. . Epoxy resins	2223/18	. . with induction hardening
2208/90	. . Phenolic resin	2223/30	. Coating surfaces
<b>2210/00</b>	<b>Fluids</b>	2223/32	. . by attaching pre-existing layers, e.g. resin sheets or foils by adhesion to a substrate; Laminating
2210/02	. defined by their properties	2223/40	. . by dipping in molten material
2210/04	. . by viscosity	2223/42	. . by spraying the coating material, e.g. plasma spraying
2210/06	. . magnetic fluids	2223/44	. . by casting molten material on the substrate
2210/08	. molten metals	2223/46	. . by welding, e.g. by using a laser to build a layer
2210/10	. water based	2223/60	. . by vapour deposition, e.g. PVD, CVD
<b>2212/00</b>	<b>Natural materials, i.e. based on animal or plant products such as leather, wood or cotton or extracted therefrom, e.g. lignin</b>	2223/70	. . by electroplating or electrolytic coating, e.g. anodising, galvanising
2212/04	. Wood	2223/80	. . by powder coating
2212/08	. Woven, unwoven fabrics, e.g. felt	<b>2226/00</b>	<b>Joining parts; Fastening; Assembling or mounting parts</b>
<b>2220/00</b>	<b>Shaping</b>	2226/10	. Force connections, e.g. clamping
2220/02	. by casting	2226/12	. . by press-fit, e.g. plug-in
2220/04	. . by injection-moulding	2226/14	. . by shrink fit, i.e. heating and shrinking part to allow assembly
2220/06	. . <i>in situ</i> casting or moulding	2226/16	. . by wedge action, e.g. by tapered or conical parts
2220/08	. . by compression-moulding	2226/18	. . by magnets, i.e. magnetic attraction to hold parts together
2220/20	. by sintering pulverised material, e.g. powder metallurgy	2226/30	. Material joints
2220/24	. by built-up welding	2226/32	. . by soldering
2220/28	. by winding impregnated fibres	2226/34	. . . by brazing
2220/40	. by deformation without removing material	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
		2226/60	. . with threaded parts, e.g. bolt and nut connections
		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	2300/34	. . Vertical, e.g. bearings for supporting a vertical shaft
2226/78	. . . . of jigsaw-puzzle type	2300/40	. related to environment, i.e. operating conditions
2226/80	. . with splines, serrations or similar profiles to prevent movement between joined parts	2300/42	. . corrosive, i.e. with aggressive media or harsh conditions
<b>2229/00</b>	<b>Setting preload</b>	2300/52	. . low temperature, e.g. cryogenic temperature
<b>2231/00</b>	<b>Running-in; Initial operation</b>	2300/54	. . high-temperature
<b>2233/00</b>	<b>Monitoring condition, e.g. temperature, load, vibration</b>	2300/62	. . low pressure, e.g. elements operating under vacuum conditions
<b>2235/00</b>	<b>Cleaning</b>	2300/64	. . high pressure, e.g. elements exposed to high pressure gases or fluids
<b>2237/00</b>	<b>Repair or replacement</b>	<b>2310/00</b>	<b>Agricultural machines</b>
<b>2240/00</b>	<b>Specified values or numerical ranges of parameters; Relations between them</b>	<b>2314/00</b>	<b>Personal or domestic articles, e.g. household appliances such as washing machines, dryers</b>
2240/02	. Flow, e.g. volume flow or mass flow	2314/70	. Furniture
2240/06	. Temperature	2314/72	. . Drawers
2240/08	. Time	2314/73	. . Chairs
2240/12	. Force, load, stress, pressure	<b>2316/00</b>	<b>Apparatus in health or amusement</b>
2240/14	. . Preload	2316/10	. in medical appliances, e.g. in diagnosis, dentistry, instruments, prostheses, medical imaging appliances
2240/18	. . Stress	2316/13	. . Dental machines
2240/22	. . Fluid pressure	2316/18	. . Pumps for pumping blood
2240/26	. Speed, e.g. rotational speed	2316/30	. Articles for sports, games and amusement, e.g. roller skates, toys
2240/30	. Angles, e.g. inclinations	<b>2320/00</b>	<b>Apparatus used in separating or mixing</b>
2240/34	. . Contact angles	2320/16	. Mixing apparatus
2240/40	. Linear dimensions, e.g. length, radius, thickness, gap	2320/23	. Milling apparatus
2240/42	. . Groove sizes	2320/42	. Centrifuges
2240/44	. . Hole or pocket sizes	<b>2322/00</b>	<b>Apparatus used in shaping articles</b>
2240/46	. . Gap sizes or clearances	2322/12	. Rolling apparatus, e.g. rolling stands, rolls
2240/48	. . Particle sizes	2322/14	. Stamping, deep-drawing or punching, e.g. die sets
2240/50	. . Crowning, e.g. crowning height or crowning radius	2322/34	. Sawing machines
2240/54	. . Surface roughness	2322/39	. General buildup of machine tools, e.g. spindles, slides, actuators
2240/56	. . Tolerances; Accuracy of linear dimensions	2322/50	. Hand tools, workshop equipment or manipulators
2240/60	. . Thickness, e.g. thickness of coatings	2322/59	. . Manipulators, e.g. robot arms
2240/64	. . . in the nanometer range	<b>2324/00</b>	<b>Apparatus used in printing</b>
2240/70	. . Diameters; Radii	2324/16	. Printing machines
2240/76	. . . Osculation, i.e. relation between radii of balls and raceway groove	<b>2326/00</b>	<b>Articles relating to transporting</b>
2240/80	. . . Pitch circle diameters [PCD]	2326/01	. Parts of vehicles in general
2240/82	. . . . Degree of filling, i.e. sum of diameters of rolling elements in relation to PCD	2326/02	. . Wheel hubs or castors
2240/84	. . . . . with full complement of balls or rollers, i.e. sum of clearances less than diameter of one rolling element	2326/05	. . Vehicle suspensions, e.g. bearings, pivots or connecting rods used therein
2240/90	. Surface areas	2326/06	. . Drive shafts
2240/94	. Volume	2326/08	. . Vehicle seats, e.g. in linear movable seats
<b>2300/00</b>	<b>Application independent of particular apparatuses</b>	2326/09	. . Windscreen wipers, e.g. pivots therefore
2300/02	. General use or purpose, i.e. no use, purpose, special adaptation or modification indicated or a wide variety of uses mentioned	2326/10	. Railway vehicles
2300/10	. related to size	2326/20	. Land vehicles
2300/12	. . Small applications, e.g. miniature bearings	2326/24	. . Steering systems, e.g. steering rods or columns
2300/14	. . Large applications, e.g. bearings having an inner diameter exceeding 500 mm	2326/26	. . Bicycle steering or suspension
2300/20	. related to type of movement	2326/28	. . Bicycle propulsion, e.g. crankshaft and its support
2300/22	. . High-speed rotation	2326/30	. Ships, e.g. propelling shafts and bearings therefor
2300/28	. . Reciprocating movement	2326/43	. Aeroplanes; Helicopters
2300/30	. related to direction with respect to gravity	2326/47	. Cosmonautic vehicles, i.e. bearings adapted for use in outer-space
2300/32	. . Horizontal, e.g. bearings for supporting a horizontal shaft	2326/58	. Conveyor systems, e.g. rollers or bearings therefor
		<b>2340/00</b>	<b>Apparatus for treating textiles</b>
		2340/18	. Apparatus for spinning or twisting

## F16C

2340/24 . Godet rolls

### **2350/00 Machines or articles related to building**

2350/26 . Excavators

2350/52 . Locks, e.g. cables to actuate door locks

2350/54 . Hinges, e.g. sliding bearings for hinges

### **2352/00 Apparatus for drilling**

### **2360/00 Engines or pumps**

2360/18 . Camshafts

2360/22 . Internal combustion engines

2360/23 . Gas turbine engines

2360/24 . . Turbochargers

2360/31 . Wind motors

2360/42 . Pumps with cylinders or pistons

2360/43 . Screw compressors

2360/44 . Centrifugal pumps

2360/45 . . Turbo-molecular pumps

2360/46 . Fans, e.g. ventilators

### **2361/00 Apparatus or articles in engineering in general**

2361/31 . Axle

2361/41 . Couplings

2361/43 . Clutches, e.g. disengaging bearing

2361/45 . Brakes

2361/53 . Spring-damper, e.g. gas springs

2361/55 . Flywheel systems

2361/61 . Toothed gear systems, e.g. support of pinion shafts

2361/63 . Gears with belts and pulleys

2361/65 . Gear shifting, change speed gear, gear box

2361/71 . Chains

2361/91 . Valves

### **2362/00 Apparatus for lighting or heating**

2362/40 . Ovens or other heatings

2362/52 . Compressors of refrigerators, e.g. air-conditioners

### **2370/00 Apparatus relating to physics, e.g. instruments**

2370/12 . Hard disk drives or the like

2370/20 . Optical, e.g. movable lenses or mirrors; Spectacles

2370/22 . . Polygon mirror

2370/38 . Electrographic apparatus

### **2380/00 Electrical apparatus**

2380/16 . X-ray tubes

2380/18 . Handling tools for semiconductor devices

2380/26 . Dynamo-electric machines or combinations  
therewith, e.g. electro-motors and generators

2380/27 . . Motor coupled with a gear, e.g. worm gears

2380/28 . . Motor, generator coupled with a flywheel