ECLA EUROPEAN CLASSIFICATION

F16J PISTONS [N: (specially adapted for dampers F16F9/32)]; CYLINDERS; SEALINGS [C9410]

[N: **WARNING**

1. The following IPC groups are not used in the internal ECLA classification scheme. Subject matter covered by these groups is classified in the following ECLA groups:

F16J15/53 covered by F16J15/43

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Note
Attention is drawn to the following places:

A47J27/08	Pressure cookers
E04B1/68	Sealing building joints
E05C9/00	Multi-point fastening of wings in general
F01B	Machines or engines in general or of reciprocating type, e.g. cylinders peculiar to steam engines F01B31/28
F02F1/00	Cylinders for combustion engines
F02F3/00	Pistons for combustion engines
F04D29/08	Sealings of non-positive displacement pumps
F17B1/04	Sealing devices for sliding parts of gas holders of variable capacity
F28F9/04	Arrangements for sealing elements into header boxes or end plates of heat-exchangers.

F16J1/00 **Pistons; Trunk pistons; Plungers** (bellows pistons F16J3/06; piston-rings or seats therefor F16J9/00; [N: manufacture of pistons B23P15/10]; rotary pistons, e.g. for "Wankel" type engines F01C; specific for combustion engines, i.e. constructed to withstand high temperature or modified for guiding, igniting, vaporising or otherwise treating the charge F02F; [N: pistons for hydraulic engines F03C]; pumps F04B; floats F16K33/00)

F16J1/00B . [N: One-piece pistons] [N9412]
F16J1/00B2 . . [N: with integral sealing lips] [N9412]

F16J1/00C . [N: obtained by assembling several pieces] [N9412]
F16J1/00C2 . . [N: of different materials] [N9412]
F16J1/00C2B . . . [N: with sealing lips] [N9412]

F16J1/01 . characterised by the use of particular materials (F16J1/02 takes precedence)

F16J1/02 . Bearing surfaces

F16J1/04 . Resilient guiding parts, e.g. skirts, particularly for trunk pistons
F16J1/06 . . with separate expansion members; Expansion members

F16J1/08 . Constructional features providing for lubrication

F16J1/09 . with means for guiding fluids (F16J1/08 takes precedence)

F16J1/10 . Connection to driving members
F16J1/12 . . with piston-rods, e.g. rigid connections
F16J1/14 . . with connecting-rods, i.e. pivotal connections
F16J1/16 . . . with gudgeon-pin; Gudgeon-pins
F16J1/18 . . . . Securing of gudgeon-pins
F16J1/20 . . . with rolling contact, other than in ball or roller bearings
F16J1/22 . . . with universal joint, e.g. ball-joint
F16J1/24 . . designed to give the piston some rotary movement about its axis

F16J3/00 **Diaphragms; Bellows; Bellows pistons** (connection of valves to inflatable elastic bodies B60C29/00; bellows or the like used in instruments G12B1/04; diaphragms for electromechanical transducers H04R7/00)

F16J3/02 . Diaphragms

F16J3/04 . Bellows
F16J3/04B . . [N: Non-metallic bellows] [N9410]
F16J3/04B2 . . . [N: Fastening details] [N9410]
F16J3/04B4 . . . [N: with particular means for limiting wear] [N9410]
F16J3/04B6 . . . [N: Split bellows] [N9410]
F16J3/04B8 . . . [N: Lubrication or venting arrangements] [N9410] [C9906]
F16J3/04C . . [N: Metallic bellows] [N9410]
F16J3/04D . . [with guiding or supporting means] [N9410]

F16J3/06 . Bellows pistons

F16J7/00 **Piston-rods**

F16J9/00 **Piston-rings,** [N: e.g. non-metallic piston-rings]**, seats therefor; Ring sealings of similar construction in general** (other sealings between pistons and cylinders F16J3/06, F16J15/16; [N: manufacture of piston-rings B23P15/06, B23P15/08]; tools for mounting or removing piston-rings or the like B25B; piston sealing arrangements on brake master cylinders B60T11/236; [N: sealing provided on pump pistons F04B53/14P]) [C9511]

F16J9/02 . L-section rings

F16J9/04 . Helical rings

F16J9/06 . using separate springs [N: or elastic elements] expanding the rings; Springs therefor; [N: Expansion by wedging] [C0208]
F16J9/06B . . [N: using metallic coiled or blade springs (F16J9/14B takes precedence)] [N0208]
F16J9/06B2 . . . [N: Coiled spring along the entire circonference] [N0208]
F16J9/06B4 . . . [N: Strip or wire along the entire circonference] [N0208]

F16J9/06C . . [N: Rings with a flat annular side rail] [N0208]
F16J9/06C2 . . . [N: Spring expander with massive cross-section] [N0208]
F16J9/06C4 . . . [N: Spring expander from sheet metal] [N0208]
F16J9/06C4B . . . . [N: corrugated in the radial direction] [N0209]
F16J9/06C4C . . . . [N: corrugated in the axial direction] [N0209]
F16J9/06C4D . . . . [N: with a "C"-shaped cross section along the entire circumference] [N0209]

F16J9/08 . with expansion obtained by pressure of the medium

F16J9/10 . Special members for adjusting the rings

F16J9/12 . Details
F16J9/14 . . Joint-closures
F16J9/14B . . . [N: of spring expanders] [N0208]
F16J9/16 . . . obtained by stacking of rings
F16J9/18 . . . with separate bridge-elements
F16J9/20 . . Rings with special cross-section (L-section rings F16J9/02); Oil-scraping rings [N: (F16J9/06 takes precedence)]
F16J9/20B . . . [N: Oil-scraping rings]

[N: **WARNING**
The group F16J9/20B is no longer used for the classification of new documents from August 1st, 2002. The backlog of this group is being continuously reclassified to F16J9/20C, and to F16J9/06 and sub-groups
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F16J9/20C . . . [N: One-piece oil-scraping rings] [N0208]
F16J9/22 . . Rings for preventing wear of grooves or like seatings
F16J9/24 . . Members preventing rotation of rings in grooves

F16J9/26 . characterised by the use of particular materials

F16J9/28 . of non-metals

F16J10/00 **Engine or like cylinders** (pressure vessels in general F16J12/00; cylinders for engines or other apparatus of particular kinds, see the appropriate subclasses, e.g. for combustion engines F02F)**; Features of hollow, e.g. cylindrical, bodies in general**

F16J10/02 . Cylinders designed to receive moving pistons or plungers
F16J10/04 . . Running faces; Liners

F16J12/00 **Pressure vessels in general** (covers therefor F16J13/00; for particular applications, see the relevant subclasses, e.g. B01J, F17C, G21C)

F16J13/00 **Covers or similar closure members for pressure vessels in general** (for engines or like cylinders F16J10/00; sealings F16J15/02; covers for box-like containers B65D43/00; devices for securing or retaining closure members B65D45/00; closures for containers not otherwise provided for B65D51/00; manholes, covers for large containers B65D90/10;; gates or closures for large containers B65D90/54; for vessels for containing or storing compressed, liquefied or solidified gases F17C13/06; steam boilers F22B)

F16J13/02 . Detachable closure members; Means for tightening closures (F16J13/16, F16J13/22 take precedence)
F16J13/04 . . attached with a bridge member
F16J13/06 . . attached only by clamps along the circumference
F16J13/06B . . . [N: the clamp comprising a ring encircling the flange]
F16J13/08 . . attached by one or more members actuated to project behind a part or parts of the frame (similar constructions for doors or windows E05C9/00)
F16J13/10 . . attached by means of a divided ring
F16J13/12 . . attached by wedging action by means of screw-thread, interrupted screw-thread, bayonet closure, or the like
F16J13/14 . . attached exclusively by spring action or elastic action

F16J13/16 . Pivoted closures (F16J13/22 takes precedence)
F16J13/18 . . pivoted directly on the frame
F16J13/20 . . mounted by mobile fastening on swinging arms

F16J13/22 . with movement parallel to the plane of the opening

F16J13/24 . with safety devices, e.g. to prevent opening prior to pressure release

F16J15/00 **Sealings** (sealing arrangements for vehicle windows, windscreens, non-fixed roofs, doors, or similar devices B60J10/00; sealing or packing elements for container closures B65D53/00; sealing arrangements in rotary-piston machines or engines F01C19/00; sealings in non-positive-displacement machines or engines F01D11/00; arrangements of sealings in combustion engines F02F11/00; sealing arrangements in rotary-piston pumps F04C27/00; sealing lead-in or lead-through insulators H01B17/30)

F16J15/00B . [N: comprising at least two sealings in succession (F16J15/16B, F16J15/40 take precedence)]
F16J15/00B2 . . [N: forming or recuperation chamber for the leaking fluid]
F16J15/00B3 . . [N: with division of the pressure (F16J15/44 takes precedence)]
F16J15/00B4 . . [N: with provision to put out of action at least one sealing; One sealing sealing only on standstill; Emergency or servicing sealings (F16J15/16C takes precedence)]

F16J15/02 . between relatively-stationary surfaces (F16J15/46, F16J15/48 take precedence)
F16J15/02B . . [N: with elastic packing (F16J15/08 takes precedence)]
F16J15/02B2 . . . [N: characterised by structure or material]
F16J15/02B2B . . . . [N: the packing being locally weakened in order to increase elasticity]
F16J15/02B2B2 . . . . . [N: and with at least one flexible lip]
F16J15/02B2B4 . . . . . [N: and with a hollow profile]
F16J15/02B4 . . . [N: the packing being mechanically expanded against the sealing surface]
F16J15/04 . . without packing between the surfaces, e.g. with ground surfaces, with cutting edge
F16J15/06 . . with solid packing compressed between sealing surfaces
F16J15/06B . . . [N: with positioning means (F16J15/08C2B takes precedence)] [C9906]
F16J15/06C . . . [N: characterised by the geometry of the seat]
F16J15/06D . . . [N: the packing combining the sealing function with other functions]

F16J15/06D2 . . . . [N: fire resistant] [C9905]
F16J15/06E . . . [N: Split packings]
F16J15/06F . . . [N: the packing swelling under working conditions] [N9905]
F16J15/08 . . . with exclusively metal packing
F16J15/08B . . . . [N: characterised by material or surface treatment]
F16J15/08B2 . . . . . [N: with a braided or knitted body]
F16J15/08C . . . . [N: Flat gaskets]
F16J15/08C2 . . . . . [N: laminated]
F16J15/08C2B . . . . . [N: with mounting aids] [N9906]
F16J15/08D . . . . [N: the sealing effect being obtained by plastic deformation of the packing]
F16J15/08E . . . . [N: the sealing effect being obtained by elastic deformation of the packing]
F16J15/08E2 . . . . . [N: the packing having a hollow profile]
F16J15/10 . . . with non-metallic packing
F16J15/10B . . . . [N: characterised by material]
F16J15/10C . . . . [N: characterised by structure]
F16J15/10C2 . . . . . [N: homogeneous]
F16J15/10D . . . . [N: Special methods for making a non-metallic packing]
F16J15/12 . . . . with metal reinforcement or covering
F16J15/12B . . . . . [N: with metal reinforcement]
F16J15/12B2 . . . . . [N: generally parallel to the surfaces]
F16J15/12B2B . . . . . {7 dots} [N: Details relating to the edges of the packing]
F16J15/12B4 . . . . . [N: generally perpendicular to the surfaces]
F16J15/12B6 . . . . . [N: consisting of additions, e.g. metallic fibres, metallic powders, randomly dispersed in the packing]
F16J15/12B8 . . . . . [N: the reinforcement being a compression stopper]
F16J15/12C . . . . . [N: with metal covering]
F16J15/14 . . by means of granular or plastic material, or fluid

F16J15/16 . between relatively moving surfaces (F16J15/50, F16J15/52 take precedence; bellows pistons F16J3/06; piston-rings or ring sealing of similar construction in general F16J9/00; spindle sealings for valves F16K41/00)
F16J15/16B . . [N: Special parts or details relating to lubrication or cooling of the sealing itself (F16J15/32C, F16J15/34B, F16J15/40 take precedence)] [C9906]
F16J15/16C . . [N: the sealing action depending on movements; pressure difference, temperature or presence of leaking fluid]
F16J15/16D . . [N: with means to prevent the extrusion of the packing]
F16J15/16F . . [N: which permits material to be continuously conveyed]
F16J15/18 . . with stuffing-boxes for elastic or plastic packings
F16J15/18B . . . [N: for plastic packings] [N9602]
F16J15/18C . . . [N: with lubricating, cooling or draining means] [N9602]
F16J15/18C2 . . . . [N: using a lantern ring] [N9602]
F16J15/18D . . . [N: Tightening mechanisms] [N9602]
F16J15/18D2 . . . . [N: with continuous adjustment of the compression of the packing] [N9602]
F16J15/18D2B . . . . . [N: using springs] [N9602]

F16J15/18E . . . [N: Self-aligning stuffing-boxes] [N9602]
F16J15/18F . . . [N: Split assemblies] [N9602]
F16J15/18G . . . [N: Means for facilitating the removal of the packing] [N9602]
F16J15/20 . . . Packing materials therefor
F16J15/22 . . . . shaped as strands, ropes, threads, ribbons, or the like
F16J15/24 . . . with radially or tangentially compressed packing
F16J15/26 . . with stuffing-boxes for rigid sealing rings
F16J15/28 . . . with sealing rings made of metal
F16J15/30 . . . with sealing rings made of carbon
F16J15/32 . . with elastic sealing lip [N: with elastic sealing, e.g. "O" ring; F16J15/34 takes precedence]
F16J15/32B . . . [N: with at least one lip]
F16J15/32B2 . . . . [N: provided with a spring-tension element]
F16J15/32B2B . . . . . [N: with a metal spring]
F16J15/32B3 . . . . [N: supported in a direction parallel to the surfaces]
F16J15/32B4 . . . . [N: supported in a direction perpendicularly to the surfaces]
F16J15/32B5 . . . . [N: protected against changes in distances between the surfaces]
F16J15/32B6 . . . . [N: formed by deforming a flat annular ring]
F16J15/32B7 . . . . [N: with a plurality of lips (F16J15/32B2 to F16J15/32B6 take precedence)]
F16J15/32B7B . . . . . [N: with at least one lip for each surface, i.e. "U" cup packings]
F16J15/32C . . . [N: Details relating to lubrication or cooling of the sealing itself (in general F16J15/16B)]
F16J15/32D . . . [N: with hydro-dynamic pumping action]
F16J15/32E . . . [N: provided with a casing]
F16J15/32E2 . . . . [N: with a rigid casing]
F16J15/32E2B . . . . . [N: comprising two elements fixed respectively on each surface]
F16J15/32E2B2 . . . . . [N: with means for detecting the relative rotation of the two elements] [N0009]
F16J15/32E2B4 . . . . . [N: the elements being separable] [N0108]
F16J15/32E3 . . . . [N: Mounting of sealing lips]
F16J15/32E3B . . . . . [N: The sealing having a break, e.g. permitting the radial mounting around a shaft]
F16J15/32E4 . . . . [N: Static sealing round the fixation on one of the surfaces]
F16J15/32F . . . [N: Special methods for making elastic sealings (moulding or like operations, see the relevant classes)]
F16J15/32G . . . [N: Structural composition; Use of special materials]
F16J15/32G2 . . . . [N: Filamentary structures, e.g. brush seal] [C0108]
F16J15/32G4 . . . . [N: Lamellar structures] [N0108]
F16J15/32H . . . [N: Measuring or controlling equipment specially adapted for elastic sealings (measuring in general G01; Controlling in general G05)]
F16J15/34 . . with slip-ring pressed against a more or less radial face on one member
F16J15/34B . . . [N: and characterised by parts or details relating to lubrication, cooling or venting of the seal]
F16J15/34B4 . . . . [N: at least one ring having an uneven slipping surface]

F16J15/34B4B . . . . . [N: with cavities (F16J15/34B4C takes precedence)]
F16J15/34B4B2 . . . . . [N: with at least one continuous groove]
F16J15/34B4B4 . . . . . [N: with means for feeding fluid directly to the face]
F16J15/34B4C . . . . . [N: with micro-cavities]
F16J15/34B4D . . . . . [N: with a wavy surface]
F16J15/34B4E . . . . . [N: the geometry of the surface being able to vary during operation]
F16J15/34C . . . [N: Pressing means]
F16J15/34C2 . . . . [N: the pressing force being applied by means of an elastic ring supporting the slip-ring]
F16J15/34C4 . . . . [N: by magnetic attraction]
F16J15/34C6 . . . . [N: the pressing force resulting from fluid pressure] [N9505]
F16J15/34C8 . . . . [N: the pressing force resulting from the action of a spring] [N9505]
F16J15/34C10 . . . . [N: without external means for pressing the ring against the face, e.g. slip-ring with a resilient lip]
F16J15/34C12 . . . . [N: the pressing force varying during operation] [N9505]
F16J15/34D . . . [N: Mounting of the seal]
F16J15/34D2 . . . . [N: Means for controlling the deformations of the contacting faces]
F16J15/34D4 . . . . [N: Means for centering or aligning the contacting faces]
F16J15/34D6 . . . . [N: Means for minimising vibrations of the slip-ring]
F16J15/34D8 . . . . [N: Pre-assembled seals, e.g. cartridge seals] [N9505]
F16J15/34D8B . . . . . [N: Tandem seals] [N9505]
F16J15/34D10 . . . . [N: Split-rings]
F16J15/34E . . . [N: with monitoring or measuring means associated with the seal] [N9505]
F16J15/34M . . . [N: use of special materials]
F16J15/36 . . . connected by a diaphragm [N: or bellow] to the other member
F16J15/36B . . . . [N: the diaphragm or bellow being made of metal]
F16J15/36B2 . . . . . [N: and comprising vibration-damping means]
F16J15/38 . . . sealed by a packing
F16J15/40 . . by means of fluid
F16J15/40C . . . [N: by changing the state of matter]
F16J15/40D . . . [N: by at least one pump]
F16J15/42 . . . kept in sealing position by centrifugal force
F16J15/43 . . . kept in sealing position by magnetic force [N9410]

F16J15/44 . Free-space packings
F16J15/44B . . [N: with floating ring]
F16J15/44B2 . . . [N: segmented] [N9511]
F16J15/44C . . [N: provided with discharge channels] [N9511]
F16J15/44D . . [N: with facing materials having honeycomb-like structure] [N9511]
F16J15/44E . . [N: with means for adjusting the clearance] [N9511]
F16J15/447 . . Labyrinth packings
F16J15/447B . . . [N: with axial path] [N9511]
F16J15/447B2 . . . . [N: Pre-assembled packings] [N9511]

F16J15/447C . . . [N: with radial path] [N9511]

F16J15/447C2 . . . . [N: Pre-assembled packings] [N9511]

F16J15/453 . . . characterised by the use of particular materials [N: (F16J15/44D takes precedence)] [C9511]

F16J15/46 . with packing ring expanded or pressed into place by fluid pressure, e.g. inflatable packings (connection of valves to inflatable elastic bodies B60C29/00; [N: for sealing arrangements in vehicles B60J10/00B; for sealing arrangements of openings in buildings E06B7/23E]; for tube connections F16L)

F16J15/48 . . influenced by the pressure within the member to be sealed

F16J15/50 . between relatively-movable members, by means of a sealing without relatively-moving surfaces, e.g. fluid-tight sealings for transmitting motion through a wall

F16J15/52 . . by means of sealing bellows or diaphragms (connection of valves to inflatable elastic bodies B60C29/00)

F16J15/52B . . . [N: fixed to a part of a transmission performing a wobbling or a circular translatory movement]

F16J15/54 . Other sealings for rotating shafts

F16J15/54B . . [N: submitted to unbalanced pressure in circumference; seals for oscillating actuator]

F16J15/56 . Other sealings for reciprocating rods