

**ECLA****EUROPEAN CLASSIFICATION****F02F**

**CYLINDERS, PISTONS OR CASINGS, FOR COMBUSTION ENGINES; ARRANGEMENTS OF SEALINGS IN COMBUSTION ENGINES** (specially adapted for rotary-piston or oscillating-piston internal-combustion engines [F02B](#); specially adapted for gas-turbine plants [F02C](#); specially adapted for jet-propulsion plants [F02K](#))

**Notes**

1. Attention is drawn to the notes preceding class [F01](#).
2. In considering the relationship between class [F16](#) and subclass [F02F](#), class [F16](#) will take precedence unless the subject-matter is specific to combustion engines.

**F02F1/00**

**Cylinders; Cylinder heads** (in general [F16J](#))

- F02F1/00B . [N: Integrally formed cylinders and cylinder heads]
- F02F1/00L . [N: Cylinder liners ([F02F1/08](#), [F02F1/16](#) take precedence)] [[N0904](#)]
- F02F1/02 . having cooling means ([cylinder heads F02F1/26](#))
- F02F1/04 . . for air cooling
- F02F1/04B . . . [N. Attachment of cylinders to crankcase]
- F02F1/06 . . . Shape or arrangement of cooling fins; Finned cylinders
- F02F1/06B . . . . [N: with means for directing or distributing cooling medium]
- F02F1/08 . . . . running-liner and cooling-part of cylinder being different parts or of different material
- F02F1/10 . . for liquid cooling
- F02F1/10B . . . [N: Attachment of cylinders to crankcase]
- F02F1/10S . . . [N: Siamese-type cylinders, i.e. cylinders cast together]
- F02F1/12 . . . Preventing corrosion of liquid-swept surfaces
- F02F1/14 . . . Cylinders with means for directing, guiding or distributing liquid stream
- F02F1/16 . . . Cylinder liners of wet type
- F02F1/16M . . . . [N: the liner being midsupported]
- F02F1/16R . . . . [N: Spacer decks]
- F02F1/18 . Other cylinders
- F02F1/18A . . [N: Oval or square cylinders]
- F02F1/18B . . [N: for use in engines with two or more pistons reciprocating within same cylinder (such engines per se [F02B75/28](#))]
- F02F1/20 . . characterised by constructional features providing for lubrication
- F02F1/22 . . characterised by having ports in cylinder wall for scavenging or charging
- F02F1/24 . Cylinder heads
- F02F1/24B . . [N: Arrangement of spark plugs or injectors]

- F02F1/24C . . [N: Cylinder heads and inlet or exhaust manifolds integrally cast together]
- F02F1/26 . . having cooling means
- F02F1/28 . . . for air cooling
- F02F1/30 . . . . Finned cylinder heads
- F02F1/30B . . . . . [N: the cylinder heads being of side valve type]
- F02F1/32 . . . . . the cylinder heads being of overhead valve type
- F02F1/34 . . . . . with means for directing or distributing cooling medium ([F02F1/32](#) takes precedence)
- F02F1/36 . . . for liquid cooling
- F02F1/36B . . . . [N: the cylinder heads being of side valve type]
- F02F1/38 . . . . the cylinder heads being of overhead valve type
- F02F1/40 . . . . Cylinder heads with means for directing, guiding, or distributing liquid stream ([F02F1/38](#) takes precedence)
- F02F1/42 . . Shape or arrangement of intake or exhaust channels in cylinder heads
- F02F1/42B . . . [N: specially adapted for four or more valves per cylinder]
- F02F1/42B1 . . . . [N: particularly for three or more inlet valves (mechanisms for driving such valves [F01L1/26B](#))]
- F02F1/42C . . . [N: Helically-shaped channels] ([F02B31/00](#) takes precedence)]
- F02F1/42E . . . [N: of intake channels] [N0911]
- F02F1/42E2 . . . . [N: with a partition wall inside the channel] [N0911]
- F02F1/42E4 . . . . [N: with a separate deviation element inside the channel] [N0911]
- F02F1/42E6 . . . . [N: with an intake liner] [N0911]
- F02F1/42F . . . [N: of exhaust channels] [N0911]
- F02F1/42F6 . . . . [N: with an exhaust liner] [N0911]
- F02F1/42H . . . [N: of both intake and exhaust channel] [N0911]
- F02F1/42H6 . . . . [N: with liners ([F02F1/42E6](#), [F02F1/42F6](#) take precedence)] [N0911]

### **F02F3/00**      **Pistons** (in general [F16J](#))

- F02F3/00B . [N: Multi-part pistons]
- F02F3/00B1 . . [N: the parts being bolted or screwed together]
- F02F3/00B2 . . [N: the parts being connected by casting, brazing, welding or clamping]
- F02F3/00B3 . . [N: the crown and skirt being interconnected by the gudgeon pin]
- F02F3/00C . [N: the inside of the pistons being provided with ribs or fins]
- F02F3/00D . [N: the pistons being constructed from specific materials]
- F02F3/00D1 . . [N: the material being steel-plate]
- F02F3/02 . having means for accomodating or controlling heat expansion
- F02F3/02B . . [N: the pistons having an oval circumference or non-cylindrical shaped skirts, e.g. oval ([F02F3/02C](#), [F02F3/02D](#) take precedence)]
- F02F3/02C . . [N: having circumferentially slotted piston skirts, e.g. T-slots]
- F02F3/02D . . [N: the skirt wall having cavities]
- F02F3/04 . . having expansion-controlling inserts

- F02F3/04B . . . [N: the inserts consisting of reinforcements in the skirt interconnecting separate wall parts, e.g. rods or strips]
- F02F3/04C . . . [N: the inserts being located in the crown]
- F02F3/04D . . . [N: the inserts being located around the gudgeon pin bearings]
- F02F3/06 . . . the inserts having bimetallic effect
- F02F3/08 . . . the inserts being ring-shaped
  
- F02F3/10 . having surface coverings ([F02F3/02](#) takes precedence)
- F02F3/10B . . [N: the coverings forming a double skirt]
- F02F3/12 . . on piston heads
- F02F3/14 . . . within combustion chambers
  
- F02F3/16 . having cooling means
- F02F3/18 . . the means being a liquid or solid coolant, e.g. sodium, in a closed chamber in piston
- F02F3/20 . . the means being a fluid flowing through or along piston
- F02F3/22 . . . the fluid being liquid
- F02F3/22S . . . . [N: the liquid being directed into blind holes]
  
- F02F3/24 . having means for guiding gases in cylinders, e.g. for guiding scavenging charge in two-stroke engines
  
- F02F3/26 . having combustion chamber in piston head ([the surface thereof being covered F02F3/14](#))
  
- F02F3/28 . Other pistons with specially-shaped head
- F02F3/28B . . [N: the head being provided with an insert located in or on the combustion-gas-swept surface]
  
- F02F5/00** **Piston rings, e.g. associated with piston crown** [N: not used see [F16J9/00](#)]
  
- F02F7/00** **Casings, e.g. crankcases** ([engine casings in general F16M](#)) [N: or frames]
  
- F02F7/00A . [N: Cylinder arrangements]
- F02F7/00A1 . . [N: Crankcases of one-cylinder engines]
- F02F7/00A2 . . [N: Crankcases of engines with cylinders in line]
- F02F7/00A3 . . [N: Crankcases of opposed piston engines]
- F02F7/00A4 . . [N: Crankcases of V-engines]
- F02F7/00A5 . . [N: Crankcases of W-, deldic, or quadratic engines, or the like]
- F02F7/00A6 . . [N: Crankcases of radial engines]
- F02F7/00A9 . . [N: Cylinders and crankshaft not in one plane (deaxation)]
  
- F02F7/00B . [N: Construction]
- F02F7/00B1 . . [N: Casings for larger engines]
- F02F7/00B1A . . . [N: Casings for horizontal engines]
- F02F7/00B2 . . [N: Space-frames]

- F02F7/00B3 . . [N: Construction kit principle (modular engines)]
- F02F7/00B4 . . [N: Built from sheet material and welded casings]
- F02F7/00B5 . . [N: Casings for two-stroke engines with scavenging conduits]
- F02F7/00B6 . . [N: Casings for small engines, especially with crankcase pumps]
  
- F02F7/00C . [N: Arrangements of mechanical drive elements]
- F02F7/00C1 . . [N: Shape of casings adapted to facilitate fitting or dismantling of engine parts]
- F02F7/00C2 . . [N: Tunnel-type frames]
- F02F7/00C3 . . [N: Crankcase pump engines]
- F02F7/00C4 . . [N: Crankshaft bearings fitted in the crankcase]
- F02F7/00C5 . . [N: Longitudinally or transversely separable crankcases]
  
- F02F7/00D . [N: Camshaft or pushrod housings (oil sumps [F01M11/00B](#))]
  
- F02F7/00E . [N: Shape of casings for other machine parts and purposes, e.g. utilisation purposes, safety]
- F02F7/00E1 . . [N: Adaptations for other accessories]
- F02F7/00E2 . . [N: Adaptations for cooling]
- F02F7/00E3 . . [N: Adaptations for fitting the engine, e.g. front-plates or bell-housings]
- F02F7/00E4 . . [N: Sound insulation (see also [F02B77/13](#))]
  
- F02F7/00F . [N: Mounting of engine casings]
  
- F02F7/00G . [N: Materials for constructing engines or their parts]
- F02F7/00G1 . . [N: Ceramic materials]
  
- F02F7/00H . [N: Constructing engine casings (welded casings [F02F7/00B4](#))]
  
- F02F11/00** **Arrangements of sealings in combustion engines** (piston rings [F02F5/00](#) [N: not used, see [F16J9/00](#)]; sealings per se [F16J](#))
  
- F02F11/00C . [N: involving cylinder heads]
- F02F11/00D . [N: involving cylinder liners]
- F02F11/00R . [N: involving rotary applications]