# SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

## F03 MACHINES OR ENGINES FOR LIQUIDS; WIND, SPRING, OR WEIGHT MOTORS; PRODUCING MECHANICAL POWER OR A REACTIVE PROPULSIVE THRUST, NOT OTHERWISE PROVIDED FOR

**F03B** **MACHINES OR ENGINES FOR LIQUIDS** (machines or engines for liquids and elastic fluids F01; positive-displacement engines for liquids F03C; positive-displacement machines for liquids F04)

**Note(s)**

1. This subclass covers:
   - engines, other than of positive-displacement type, driven by liquids;
   - machines, other than of positive-displacement type, for liquids.
2. Attention is drawn to the Notes preceding class F01, especially as regards the definition of "reaction type".

**Subclass index**



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**1/00** **Engines of impulse type, i.e. turbines with jets of high-velocity liquid impinging on bladed or like rotors, e.g. Pelton wheels; Parts or details peculiar thereto [1, 2006.01]**

1/02 • Buckets; Bucket-carrying rotors **[1, 2006.01]**

1/04 • Nozzles (in general B05B); Nozzle-carrying members **[1, 2006.01]**

**3/00** **Machines or engines of reaction type; Parts or details peculiar thereto [1, 2006.01]**

3/02 • with radial flow at high-pressure side and axial flow at low-pressure side of rotors, e.g. Francis turbines **[1, 2006.01]**

3/04 • with substantially axial flow throughout rotors, e.g. propeller turbines **[1, 2006.01]**

3/06 • • with adjustable blades, e.g. Kaplan turbines **[1, 2006.01]**

3/08 • with pressure/velocity transformation exclusively in rotors **[1, 2006.01]**

3/10 • characterised by having means for functioning alternatively as pumps or turbines **[1, 2006.01]**

3/12 • Blades; Blade-carrying rotors **[1, 2006.01]**

3/14 • • Rotors having adjustable blades **[1, 2006.01]**

3/16 • Stators **[1, 2006.01]**

3/18 • • Stator blades; Guide conduits or vanes, e.g. adjustable **[1, 2006.01]**

**5/00** **Machines or engines characterised by non-bladed rotors, e.g. serrated, using friction [1, 2006.01]**

**7/00** **Water wheels [1, 2006.01]**

**9/00** **Endless-chain type machines or engines [1, 2006.01]**

**11/00** **Parts or details not provided for in, or of interest apart from, groups F03B 1/00-F03B 9/00** (controlling F03B 15/00) **[1, 2006.01]**

11/02 • Casings **[1, 2006.01]**

11/04 • for diminishing cavitation or vibration, e.g. balancing **[1, 2006.01]**

11/06 • Bearing arrangements **[1, 2006.01]**

11/08 • for removing foreign matter, e.g. mud **[1, 2006.01]**

**13/00** **Adaptations of machines or engines for special use; Combinations of machines or engines with driving or driven apparatus** (if the apparatus aspects are predominant, see the relevant places for such apparatus, e.g. H02K 7/18)**; Power stations or aggregates** (hydraulic-engineering aspects E02B; incorporating only machines or engines of positive-displacement type F03C) **[1, 2006.01]**

13/02 • Adaptations for drilling wells **[1, 2006.01]**

13/04 • Adaptations for use in dentistry **[1, 2006.01]**

13/06 • Stations or aggregates of water-storage type (turbines characterised by having means for functioning alternatively as pumps F03B 3/10) **[1, 2006.01]**

13/08 • Machine or engine aggregates in dams or the like; Conduits therefor **[1, 2006.01]**

13/10 • Submerged units incorporating electric generators or motors **[1, 2006.01]**

13/12 • characterised by using wave or tide energy **[1, 2006.01]**

13/14 • • using wave energy **[4, 2006.01]**

13/16 • • • using the relative movement between a wave-operated member and another member **[4, 2006.01]**

13/18 • • • • wherein the other member is fixed, at least at one point, with respect to the sea bed or shore **[4, 2006.01]**

13/20 • • • • wherein both members are movable relative to the sea bed or shore **[4, 2006.01]**

13/22 • • • using the flow of water resulting from wave movements, e.g. to drive a hydraulic motor or turbine **[4, 2006.01]**

13/24 • • • to produce a flow of air, e.g. to drive an air turbine **[4, 2006.01]**

13/26 • • using tide energy **[4, 2006.01]**

**15/00** **Controlling** (controlling in general G05) **[1, 2006.01]**

15/02 • by varying liquid flow **[1, 2006.01]**

15/04 • • of turbines (rotors having adjustable blades F03B 3/06, F03B 3/14; adjustable guide vanes F03B 3/18; specially adapted for turbines with jets of high-velocity liquid impinging on bladed or like rotors F03B 15/20) **[1, 2006.01]**

15/06 • • • Regulating, i.e. acting automatically **[1, 2006.01]**

15/08 • • • • by speed, e.g. by measuring electric frequency or liquid flow **[1, 2006.01]**

15/10 • • • • • without retroactive action **[1, 2006.01]**

15/12 • • • • • with retroactive action **[1, 2006.01]**

15/14 • • • • by or of water level **[1, 2006.01]**

15/16 • • • • by power output **[1, 2006.01]**

15/18 • • • • for safety purposes, e.g. preventing overspeed **[1, 2006.01]**

15/20 • • specially adapted for turbines with jets of high-velocity liquid impinging on bladed or like rotors (nozzles F03B 1/04) **[1, 2006.01]**

15/22 • • • for safety purposes **[1, 2006.01]**

**17/00** **Other machines or engines [1, 2006.01]**

17/02 • using hydrostatic thrust **[1, 2006.01]**

17/04 • • Alleged perpetua mobilia **[1, 2006.01]**

17/06 • using liquid flow, e.g. of swinging-flap type **[1, 2006.01]**

**F03C** **POSITIVE-DISPLACEMENT ENGINES DRIVEN BY LIQUIDS** (positive-displacement engines for liquids and elastic fluids F01; positive-displacement machines for liquids F04; fluid-pressure actuators F15B; fluid gearing F16H)

**Note(s)**

Attention is drawn to the Notes preceding class F01, especially as regards the definitions of "positive displacement", "rotary-piston machines", "oscillating-piston machines", "rotary-piston", "co-operating members", "movement of co-operating members", "teeth or tooth-equivalents", and "internal axis".

**1/00** **Reciprocating-piston liquid engines [1, 2006.01]**

1/007 • with single cylinder, double-acting piston **[5, 2006.01]**

1/013 • with single cylinder, single-acting piston **[5, 2006.01]**

1/02 • with multiple cylinders, characterised by the number or arrangement of cylinders (with movable cylinders F03C 1/22; of flexible-wall type F03C 7/00) **[1, 2006.01]**

1/03 • • with movement in two directions being obtained by two single-acting piston liquid engines, each acting in one direction **[5, 2006.01]**

1/04 • • with cylinders in star- or fan-arrangement **[1, 2006.01]**

1/047 • • • the pistons co-operating with an actuated element at the outer ends of the cylinders **[5, 2006.01]**

1/053 • • • the pistons co-operating with an actuated element at the inner ends of the cylinders **[5, 2006.01]**

1/06 • • with cylinder axes generally coaxial with, or parallel or inclined to, main shaft axis **[1, 2006.01]**

1/08 • Distributing valve-gear peculiar thereto (for multiple-cylinder engines F03C 1/34; for engines with positive displacement in general F01L) **[1, 2006.01]**

1/10 • • actuated by piston or piston-rod **[1, 2006.01]**

1/12 • • • mechanically **[1, 5, 2006.01]**

1/14 • • actuated by the driving liquid of the engine **[1, 5, 2006.01]**

1/16 • • Speed controlling, equalising, or cushioning **[1, 5, 2006.01]**

1/20 • • specially adapted for engines generating vibration only **[1, 2006.01]**

1/22 • with movable cylinders **[1, 2006.01]**

1/24 • • in which the liquid exclusively displaces one or more pistons reciprocating in rotary cylinders **[1, 2006.01]**

1/247 • • • with cylinders in star- or fan-arrangement **[5, 2006.01]**

1/253 • • • with cylinder axes generally coaxial with, or parallel to, main shaft axis **[5, 2006.01]**

1/26 • adapted for special use or combined with apparatus driven thereby (aspects predominantly concerning the driven apparatus, see the relevant classes for such apparatus) **[1, 2006.01]**

1/28 • Pistons specially adapted therefor **[5, 2006.01]**

1/30 • Cams specially adapted therefor **[5, 2006.01]**

1/32 • Cylinders specially adapted therefor **[5, 2006.01]**

1/34 • Distribution members specially adapted for multiple-cylinder engines **[5, 2006.01]**

1/36 • • Cylindrical distribution members **[5, 2006.01]**

1/38 • • Plate-like distribution members **[5, 2006.01]**

1/40 • Control specially adapted therefor **[5, 2006.01]**

**2/00** **Rotary-piston engines** (in which the liquid exclusively displaces one or more piston reciprocating in rotary cylinders F03C 1/24) **[3, 2006.01]**

**Note(s) [3]**

Group F03C 2/30 takes precedence over groups F03C 2/02-F03C 2/24.

2/02 • of arcuate-engagement type, i.e. with circular translatory movement of co-operating members, each member having the same number of teeth or tooth-equivalents **[3, 2006.01]**

2/08 • of intermeshing-engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing **[3, 2006.01]**

2/22 • of internal-axis type with equidirectional movement of co-operating members at the points of engagement, or with one of the co-operating members being stationary, the inner member having more teeth or tooth-equivalents than the outer member **[3, 2006.01]**

2/24 • of counter-engagement type, i.e. the movement of co-operating members at the points of engagement being in opposite directions **[3, 2006.01]**

2/30 • having the characteristics covered by two or more of groups F03C 2/02, F03C 2/08, F03C 2/22, F03C 2/24 or having the characteristics covered by one of these groups together with some other type of movement between co-operating members **[3, 2006.01]**

**4/00 Oscillating-piston engines [3, 2006.01]**

**7/00 Engines of flexible-wall type [2010.01]**

**99/00 Subject matter not provided for in other groups of this subclass [2010.01]**

## F03D WIND MOTORS

**Note(s)**

1. This subclass covers wind motors, i.e. mechanisms for converting the energy of wind into useful mechanical power, and the transmission of such power to its point of use.
2. This subclass does not cover electrical power generation or distribution aspects of wind-power plants, which are covered by section H, e.g. H02J or H02P.
3. In this subclass, the following terms or expressions are used with the meanings indicated:
   - "rotor" means the wind-engaging parts of the wind motor and the rotary member carrying them;
   - "rotation axis" means the axis of rotation of the rotor.

**1/00 Wind motors with rotation axis substantially parallel to the air flow entering the rotor** (controlling thereof F03D 7/02) **[1, 2006.01]**

1/02 • having a plurality of rotors **[1, 2006.01]**

1/04 • having stationary wind-guiding means, e.g. with shrouds or channels (F03D 9/35 takes precedence) **[1, 2006.01]**

1/06 • Rotors **[1, 2006.01]**

**3/00 Wind motors with rotation axis substantially perpendicular to the air flow entering the rotor** (controlling thereof F03D 7/06) **[1, 2006.01]**

3/02 • having a plurality of rotors **[1, 2006.01]**

3/04 • having stationary wind-guiding means, e.g. with shrouds or channels (F03D 9/35 takes precedence) **[1, 2006.01]**

3/06 • Rotors **[1, 2006.01]**

**5/00 Other wind motors** (controlling thereof F03D 7/00) **[1, 2006.01]**

5/02 • the wind-engaging parts being attached to endless chains or the like **[1, 2006.01]**

5/04 • the wind-engaging parts being attached to carriages running on tracks or the like **[1, 2006.01]**

5/06 • the wind-engaging parts swinging to-and-fro and not rotating **[1, 2006.01]**

**7/00 Controlling wind motors** (supplying or distributing electrical power H02J, e.g. arrangements for adjusting, eliminating or compensating reactive power in networks H02J 3/18; controlling electric generators H02P, e.g. arrangements for controlling electric generators for the purpose of obtaining a desired output H02P 9/00) **[1, 2006.01]**

7/02 • the wind motors having rotation axis substantially parallel to the air flow entering the rotor **[1, 2006.01]**

7/04 • • Automatic control; Regulation **[1, 2006.01]**

7/06 • the wind motors having rotation axis substantially perpendicular to the air flow entering the rotor **[1, 2006.01]**

**9/00 Adaptations of wind motors for special use; Combinations of wind motors with apparatus driven thereby; Wind motors specially adapted for installation in particular locations** (hybrid wind-photovoltaic energy systems for the generation of electric power H02S 10/12) **[1, 2006.01, 2016.01]**

9/10 • Combinations of wind motors with apparatus storing energy **[2016.01]**

9/11 • • storing electrical energy **[2016.01]**

9/12 • • storing kinetic energy, e.g. using flywheels **[2016.01]**

9/13 • • storing gravitational potential energy **[2016.01]**

9/14 • • • using liquids **[2016.01]**

9/16 • • • using weights **[2016.01]**

9/17 • • storing energy in pressurised fluids **[2016.01]**

9/18 • • storing heat **[2016.01]**

9/19 • • storing chemical energy, e.g. using electrolysis **[2016.01]**

9/20 • Wind motors characterised by the driven apparatus (F03D 9/10 takes precedence) **[2016.01]**

9/22 • • the apparatus producing heat **[2016.01]**

9/25 • • the apparatus being an electrical generator (F03D 9/22 takes precedence) **[2016.01]**

9/28 • • the apparatus being a pump or a compressor **[2016.01]**

9/30 • Wind motors specially adapted for installation in particular locations (means for mounting or supporting wind motors F03D 13/20) **[2016.01]**

9/32 • • on moving objects, e.g. vehicles **[2016.01]**

9/34 • • on stationary objects or on stationary man-made structures **[2016.01]**

9/35 • • • within towers, e.g. using chimney effects **[2016.01]**

9/37 • • • • with means for enhancing the air flow within the tower, e.g. by heating **[2016.01]**

9/39 • • • • • by circulation or vortex formation **[2016.01]**

9/41 • • • • • by using the wind outside the tower, e.g. using ejectors **[2016.01]**

9/43 • • • using infrastructure primarily used for other purposes, e.g. masts for overhead railway power lines **[2016.01]**
9/45 • • • • Building formations **[2016.01]**
9/46 • • • • Tunnels or streets **[2016.01]**
9/48 • • using landscape topography, e.g. valleys **[2016.01]**

**13/00 Assembly, mounting or commissioning of wind motors; Arrangements specially adapted for transporting wind motor components [2016.01]**
13/10 • Assembly of wind motors; Arrangements for erecting wind motors **[2016.01]**
13/20 • Arrangements for mounting or supporting wind motors; Masts or towers for wind motors **[2016.01]**
13/25 • • specially adapted for offshore installation **[2016.01]**
13/30 • Commissioning, e.g. inspection, testing or final adjustment before releasing for production **[2016.01]**
13/35 • • Balancing static or dynamic imbalances **[2016.01]**
13/40 • Arrangements or methods specially adapted for transporting wind motor components **[2016.01]**

**15/00 Transmission of mechanical power [2016.01]**
15/10 • using gearing not limited to rotary motion, e.g. with oscillating or reciprocating members **[2016.01]**
15/20 • Gearless transmission, i.e. direct-drive **[2016.01]**

**17/00 Monitoring or testing of wind motors, e.g. diagnostics** (testing during commissioning of wind motors F03D 13/30) **[2016.01]**

**80/00 Details, components or accessories not provided for in groups F03D 1/00-F03D 17/00 [2016.01]**
80/10 • Arrangements for warning air traffic **[2016.01]**
80/20 • Arrangements for avoiding shadow flicker **[2016.01]**
80/30 • Lightning protection **[2016.01]**
80/40 • Ice detection; De-icing means **[2016.01]**
80/50 • Maintenance or repair **[2016.01]**
80/55 • • Cleaning (F03D 80/40 takes precedence) **[2016.01]**
80/60 • Cooling or heating of wind motors **[2016.01]**
80/70 • Bearing or lubricating arrangements **[2016.01]**
80/80 • Arrangement of components within nacelles or towers **[2016.01]**

**F03G SPRING, WEIGHT, INERTIA, OR LIKE MOTORS; MECHANICAL-POWER-PRODUCING DEVICES OR MECHANISMS, NOT OTHERWISE PROVIDED FOR OR USING ENERGY SOURCES NOT OTHERWISE PROVIDED FOR** (arrangements in connection with power supply in vehicles from force of nature B60K 16/00; electric propulsion with power supply in vehicles from force of nature B60L 8/00)

**Note(s)**

In this subclass, the following term is used with the meaning indicated:
- "motors" means mechanisms for producing mechanical power from potential energy of solid bodies.

**1/00 Spring motors** (spring-driven toys A63H; springs in general F16F; precision time mechanisms, e.g. for clocks or watches, G04B) **[1, 2006.01]**
1/02 • characterised by shape or material of spring, e.g. helical, spiral, coil **[1, 2006.01]**
1/04 • • using rubber springs **[1, 2006.01]**
1/06 • Other parts or details **[1, 2006.01]**
1/08 • • for winding **[1, 2006.01]**
1/10 • • for producing output movement other than rotary, e.g. vibratory **[1, 2006.01]**

**3/00 Other motors, e.g. gravity or inertia motors [1, 2006.01]**
3/02 • using wheels with circumferentially-arranged compartments co-operating with solid falling bodies (F03G 3/04 takes precedence) **[1, 2006.01]**
3/04 • driven by sand or like fluent solid material **[1, 2006.01]**
3/06 • using pendulums **[1, 2006.01]**
3/08 • using flywheels **[1, 2006.01]**

**4/00 Devices for producing mechanical power from geothermal energy [5, 2006.01]**
4/02 • with direct fluid contact **[5, 2006.01]**
4/04 • with deep-well turbo-pump **[5, 2006.01]**
4/06 • with fluid flashing **[5, 2006.01]**

**5/00 Devices for producing mechanical power from muscle energy** (driving cycles B62M) **[1, 2006.01]**
5/02 • of endless-walk type, e.g. treadmills **[1, 2006.01]**
5/04 • • Horsemills or the like **[1, 2006.01]**
5/06 • other than of endless-walk type **[1, 2006.01]**
5/08 • • for combined actuation by different limbs, e.g. hand and leg **[1, 2006.01]**

**6/00 Devices for producing mechanical power from solar energy** (solar boilers F24) **[5, 2006.01]**
6/02 • using a single state working fluid **[5, 2006.01]**
6/04 • • gaseous **[5, 2006.01]**
6/06 • with solar energy concentrating means **[5, 2006.01]**

**7/00 Mechanical-power-producing mechanisms, not otherwise provided for or using energy sources not otherwise provided for [1, 2006.01]**
7/04 • using pressure differences or thermal differences occurring in nature (F03G 7/06 takes precedence) **[1, 2006.01]**
7/05 • • Ocean thermal energy conversion, i.e. OTEC **[5, 2006.01]**
7/06 • using expansion or contraction of bodies due to heating, cooling, moistening, drying, or the like (using thermal expansion of non-vaporising liquids F01K) **[1, 2006.01]**
7/08 • recovering energy derived from swinging, rolling, pitching, or like movements, e.g. from the vibrations of a machine **[1, 2006.01]**
7/10 • Alleged perpetua mobilia (using hydrostatic thrust F03B 17/04) **[1, 2006.01]**

**F03H** **PRODUCING A REACTIVE PROPULSIVE THRUST, NOT OTHERWISE PROVIDED FOR** (from combustion products F02K)

**1/00** **Use of plasma to produce a reactive propulsive thrust** (generating plasma H05H 1/00) **[1, 2006.01]**

**3/00** **Use of photons to produce a reactive propulsive thrust [1, 2006.01]**

**99/00** **Subject matter not provided for in other groups of this subclass [2009.01]**