

F02 COMBUSTION ENGINES (cyclically operating valves therefor, lubricating, exhausting, or silencing engines F01); **HOT-GAS OR COMBUSTION-PRODUCT ENGINE PLANTS**

F02C GAS-TURBINE PLANTS; AIR INTAKES FOR JET-PROPULSION PLANTS; CONTROLLING FUEL SUPPLY IN AIR-BREATHING JET-PROPULSION PLANTS (construction of turbines F01D; jet-propulsion plants F02K; construction of compressors or fans F04; combustion apparatus in which combustion takes place in a fluidised bed of fuel or other particles F23C 10/00; generating combustion products of high pressure or high velocity F23R; using gas turbines in compression refrigeration plants F25B 11/00; using gas-turbine plants in vehicles, see the relevant vehicle classes)

- (1) This subclass covers:
 - combustion product or hot gas turbine plants;
 - internal combustion turbines or turbine plants;
 - turbine plants in which the working fluid is an unheated, pressurised gas.
- (2) This subclass does not cover:
 - steam turbine plants, which are covered by subclass F01K;
 - special vapour plants, which are covered by subclass F01K.
- (3) In this subclass, the following expression is used with the meaning indicated:
 - “gas-turbine plants” covers all the subject matter of Note (1) above and covers also features of jet-propulsion plants common to gas-turbine plants.
- (4) Attention is drawn to the Notes preceding class F01.

- | | |
|--|---|
| <p>1/00 Gas-turbine plants characterised by the use of hot gases or unheated pressurised gases, as the working fluid (by the use of combustion products F02C 3/00, F02C 5/00) [3]</p> <p>1/02 . the working fluid being an unheated pressurised gas [3]</p> <p>1/04 . the working fluid being heated indirectly [3]</p> <p>1/05 . . characterised by the type or source of heat, e.g. using nuclear or solar energy [3]</p> <p>1/06 . . . using reheated exhaust gas (F02C 1/08 takes precedence) [3]</p> <p>1/08 . . Semi-closed cycles [3]</p> <p>1/10 . . Closed cycles [3]</p> <p>3/00 Gas-turbine plants characterised by the use of combustion products as the working fluid (generated by intermittent combustion F02C 5/00)</p> <p>3/02 . using exhaust-gas pressure in a pressure exchanger to compress combustion-air (pressure exchangers <u>per se</u> F04F 11/02)</p> <p>3/04 . having a turbine driving a compressor (power transmission arrangements F02C 7/36; control of working fluid flow F02C 9/16) [5]</p> <p>3/045 . . having compressor and turbine passages in a single rotor (F02C 3/073 takes precedence) [3]</p> <p>3/05 . . . the compressor and the turbine being of the radial flow type [3]</p> <p>3/055 . . the compressor being of the positive-displacement type [3]</p> <p>3/06 . . the compressor comprising only axial stages (F02C 3/10 takes precedence) [3]</p> <p>3/067 . . . having counter-rotating rotors (F02C 3/073 takes precedence) [3]</p> <p>3/073 . . . the compressor and turbine stages being concentric [3]</p> <p>3/08 . . the compressor comprising at least one radial stage (F02C 3/10 takes precedence) [3]</p> <p>3/09 . . . of the centripetal type [3]</p> <p>3/10 . . with another turbine driving an output shaft but not driving the compressor</p> | <p>3/107 . . with two or more rotors connected by power transmission [5]</p> <p>3/113 . . . with variable power transmission between rotors [5]</p> <p>3/13 . . having variable working fluid interconnections between turbines or compressors or stages of different rotors [5]</p> <p>3/14 . characterised by the arrangement of the combustion chamber in the plant (combustion chambers <u>per se</u> F23R) [3]</p> <p>3/16 . . the combustion chambers being formed at least partly in the turbine rotor</p> <p>3/20 . using a special fuel, oxidant, or dilution fluid to generate the combustion products [3]</p> <p>3/22 . . the fuel or oxidant being gaseous at standard temperature and pressure (F02C 3/28 takes precedence) [3]</p> <p>3/24 . . the fuel or oxidant being liquid at standard temperature and pressure [3]</p> <p>3/26 . . the fuel or oxidant being solid or pulverulent, e.g. in slurry or suspension</p> <p>3/28 . . . using a separate gas producer for gasifying the fuel before combustion [3]</p> <p>3/30 . . Adding water, steam or other fluids to the combustible ingredients or to the working fluid before discharge from the turbine (heating of air intakes to prevent icing F02C 7/047) [3]</p> <p>3/32 . Inducing air flow by fluid jet, e.g. ejector action [3]</p> <p>3/34 . with recycling of part of the working fluid, i.e. semi-closed cycles with combustion products in the closed part of the cycle [3]</p> <p>3/36 . Open cycles [3]</p> <p>5/00 Gas-turbine plants characterised by the working fluid being generated by intermittent combustion</p> <p>5/02 . characterised by the arrangement of the combustion chamber in the plant (combustion chambers <u>per se</u> F23R) [3]</p> <p>5/04 . . the combustion chambers being formed at least partly in the turbine rotor</p> |
|--|---|

- 5/06 . the working fluid being generated in an internal-combustion gas generator of the positive-displacement type having essentially no mechanical power output (internal-combustion engines with prolonged expansion using exhaust gas turbines F02B)
- 5/08 . . the gas generator being of the free-piston type
- 5/10 . the working fluid forming a resonating or oscillating gas column, i.e. the combustion chambers having no positively actuated valves, e.g. using Helmholtz effect [3]
- 5/11 . . using valveless combustion chambers [3]
- 5/12 . the combustion chambers having inlet or outlet valves, e.g. Holzwarth gas-turbine plants
- 6/00 Plural gas-turbine plants; Combinations of gas-turbine plants with other apparatus** (aspects predominantly concerning such apparatus, see the relevant classes for the apparatus); **Adaptations of gas-turbine plants for special use [3]**
- 6/02 . Plural gas-turbine plants having a common power output [3]
- 6/04 . Gas-turbine plants providing heated or pressurised working fluid for other apparatus, e.g. without mechanical power output (F02C 6/18 takes precedence) [3]
- 6/06 . . providing compressed gas (F02C 6/10 takes precedence) [3]
- 6/08 . . . the gas being bled from the gas-turbine compressor [3]
- 6/10 . . supplying working fluid to a user, e.g. a chemical process, which returns working fluid to a turbine of the plant [3]
- 6/12 . . . Turbochargers, i.e. plants for augmenting mechanical power output of internal-combustion piston engines by increase of charge pressure [3]
- 6/14 . Gas-turbine plants having means for storing energy, e.g. for meeting peak loads [3]
- 6/16 . . for storing compressed air [3]
- 6/18 . using the waste heat of gas-turbine plants outside the plants themselves, e.g. gas-turbine power heat plants (using waste heat as source of energy for refrigeration plants F25B 27/02) [3]
- 6/20 . Adaptations of gas-turbine plants for driving vehicles [3]
- 7/00 Features, component parts, details or accessories, not provided for in, or of interest apart from, groups F02C 1/00 F02C 6/00; Air intakes for jet-propulsion plants** (controlling F02C 9/00) [3]
- 7/04 . Air intakes for gas-turbine plants or jet-propulsion plants [3]
- 7/042 . . having variable geometry [3]
- 7/045 . . having provisions for noise suppression [3]
- 7/047 . . Heating to prevent icing [3]
- 7/05 . . having provisions for obviating the penetration of damaging objects or particles [3]
- 7/052 . . . with dust-separation devices [3]
- 7/055 . . . with intake grids, screens or guards [3]
- 7/057 . . Control or regulation (conjointly with fuel supply control F02C 9/50, with nozzle area control F02K 1/16) [3]
- 7/06 . Arrangement of bearings (bearings F16C); Lubricating (of engines in general F01M) [3]
- 7/08 . Heating air supply before combustion, e.g. by exhaust gases
- 7/10 . . by means of regenerative heat-exchangers
- 7/105 . . . of the rotary type (rotary heat exchangers per se F28D) [3]
- 7/12 . Cooling of plants (of component parts, see the relevant subclasses, e.g. F01D; cooling of engines in general F01P)
- 7/14 . . of fluids in the plant
- 7/141 . . . of working fluid (F02C 3/30 takes precedence) [3]
- 7/143 before or between the compressor stages [3]
- 7/16 . . characterised by cooling medium
- 7/18 . . . the medium being gaseous, e.g. air
- 7/20 . Mounting or supporting of plant; Accommodating heat expansion or creep
- 7/22 . Fuel supply systems
- 7/224 . . Heating fuel before feeding to the burner [3]
- 7/228 . . Dividing fuel between various burners [3]
- 7/232 . . Fuel valves; Draining valves or systems (valves in general F16K) [3]
- 7/236 . . Fuel delivery systems comprising two or more pumps [3]
- 7/24 . Heat or noise insulation (air intakes having provisions for noise suppression F02C 7/045; turbine exhaust heads, chambers, or the like F01D 25/30; silencing nozzles of jet-propulsion plants F02K 1/00) [3]
- 7/25 . . Fire protection or prevention (in general A62) [3]
- 7/26 . Starting; Ignition
- 7/262 . . Restarting after flame-out [3]
- 7/264 . . Ignition [3]
- 7/266 . . . Electric (sparking plugs H01T) [3]
- 7/268 . . Starting drives for the rotor [3]
- 7/27 . . . Fluid drives (turbine starters F02C 7/277) [3]
- 7/272 generated by cartridges [3]
- 7/275 . . . Mechanical drives [3]
- 7/277 the starter being a turbine [3]
- 7/28 . Arrangement of seals
- 7/30 . Preventing corrosion in gas-swept spaces
- 7/32 . Arrangement, mounting, or driving, of auxiliaries
- 7/36 . Power transmission between the different shafts of the gas-turbine plant, or between the gas-turbine plant and the power user (F02C 7/32 takes precedence; couplings for transmitting rotation F16D; gearing in general F16H) [3]
- 9/00 Controlling gas-turbine plants; Controlling fuel supply in air-breathing jet-propulsion plants** (controlling air intakes F02C 7/057; controlling turbines F01D; controlling compressors F04D 27/00) [3]
- 9/16 . Control of working fluid flow (F02C 9/48 takes precedence; control of air-intake flow F02C 7/057) [3]
- 9/18 . . by bleeding, by-passing or acting on variable working fluid interconnections between turbines or compressors or their stages [3,5]
- 9/20 . . by throttling; by adjusting vanes [3]
- 9/22 . . . by adjusting turbine vanes [3]
- 9/24 . . Control of the pressure level in closed cycles [3]
- 9/26 . Control of fuel supply (F02C 9/48 takes precedence; fuel valves F02C 7/232) [3]
- 9/28 . . Regulating systems responsive to plant or ambient parameters, e.g. temperature, pressure, rotor speed (F02C 9/30 F02C 9/38, F02C 9/44 take precedence) [3]
- 9/30 . . characterised by variable fuel pump output [3]
- 9/32 . . characterised by throttling of fuel (F02C 9/38 takes precedence) [3]

- 9/34 . . . Joint control of separate flows to main and auxiliary burners **[3]**
- 9/36 . . characterised by returning of fuel to sump (F02C 9/38 takes precedence) **[3]**
- 9/38 . . characterised by throttling and returning of fuel to sump **[3]**
- 9/40 . . specially adapted to the use of a special fuel or a plurality of fuels **[3]**
- 9/42 . . specially adapted for the control of two or more plants simultaneously **[3]**
- 9/44 . . responsive to the speed of aircraft, e.g. Mach number control, optimisation of fuel consumption **[3]**
- 9/46 . . Emergency fuel control **[3]**
- 9/48 . Control of fuel supply conjointly with another control of the plant (with nozzle section control F02K 1/17) **[3]**
- 9/50 . . with control of working fluid flow **[3]**
- 9/52 . . . by bleeding or by-passing the working fluid **[3]**
- 9/54 . . . by throttling the working fluid, by adjusting vanes **[3]**
- 9/56 . . with power transmission control **[3]**
- 9/58 . . . with control of a variable-pitch propeller **[3]**