

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

### F01 MACHINES OR ENGINES IN GENERAL; ENGINE PLANTS IN GENERAL; STEAM ENGINES

**F01K STEAM ENGINE PLANTS; STEAM ACCUMULATORS; ENGINE PLANTS NOT OTHERWISE PROVIDED FOR; ENGINES USING SPECIAL WORKING FLUIDS OR CYCLES** (gas-turbine or jet-propulsion plants F02; steam generation F22; nuclear power plants, engine arrangements therein G21D)

#### Note(s)

Attention is drawn to the Notes preceding class F01, especially as regards the definitions of "steam" and "special vapour".

#### Subclass index

##### STEAM ENGINE PLANTS

Characterised by the use of

accumulators or heaters; storing means in alkali; specific types of engines.....3/00, 5/00, 7/00

special steam systems, cycles, or processes.....7/00

Characterised by the disposition of

condenser; structural combination of engine and boiler or condenser.....9/00, 11/00

Not otherwise provided for.....21/00

General layout or operation; adaptations for special use.....13/00, 15/00

Utilisation of steam

for feed-water heating; in the regeneration or other treating; for other purposes.....7/34, 19/00, 17/00

##### ENGINE PLANTS NOT RESTRICTED TO STEAM UTILISATION

With several engines driven by different fluids.....23/00

Not otherwise provided for, other types with special working fluids or working with enclosed cycles.....25/00, 27/00

STEAM ACCUMULATORS.....1/00

##### SPECIAL TYPES OF ENGINES

Steam engines.....7/00

Other than steam.....25/00

- 1/00 Steam accumulators** (use of accumulators in steam engine plants F01K 3/00)
- 1/02 • for storing steam otherwise than in a liquid
  - 1/04 • for storing steam in a liquid, e.g. Ruth type (in alkali to increase steam pressure F22B 1/20)
  - 1/06 • • Internal fittings facilitating steam distribution, steam formation, or circulation (acting during charging or discharging F01K 1/08; fittings facilitating circulation through multiple accumulators F01K 1/14)
  - 1/08 • Charging or discharging of accumulators with steam (peculiar to multiple accumulators F01K 1/12)
  - 1/10 • specially adapted for superheated steam
  - 1/12 • Multiple accumulators; Charging, discharging, or regulating peculiar thereto
  - 1/14 • • Circulation
  - 1/16 • Other safety or regulating means
  - 1/18 • • for steam pressure
  - 1/20 • Other steam-accumulator parts, details, or accessories

#### Steam engine plants

- 3/00 Plants characterised by the use of steam or heat accumulators, or intermediate steam heaters, therein** (regenerating exhaust steam F01K 19/00)
- 3/02 • Use of accumulators and specific engine types; Regulating thereof
  - 3/04 • • the engine being of multiple-inlet-pressure type
  - 3/06 • • the engine being of extraction or non-condensing type
  - 3/08 • Use of accumulators, the plant being specially adapted for a specific use
  - 3/10 • • for vehicle drive, e.g. for accumulator locomotives
  - 3/12 • having two or more accumulators
  - 3/14 • having both steam accumulator and heater, e.g. superheating accumulator (steam superheaters per se F22G)
  - 3/16 • • Mutual arrangement of accumulator and heater
  - 3/18 • having heaters (having both steam accumulator and heater F01K 3/14; steam heaters per se F22)
  - 3/20 • • with heating by combustion gases of main boiler
  - 3/22 • • • Controlling, e.g. starting, stopping
  - 3/24 • • with heating by separately-fired heaters
  - 3/26 • • with heating by steam

5/00	<b>Plants characterised by use of means for storing steam in an alkali to increase steam pressure, e.g. of Honigmann or Koenemann type</b>	11/04	• the boilers or condensers being rotated in use
5/02	• used in regenerative installation	13/00	<b>General layout or general methods of operation, of complete steam engine plants</b>
7/00	<b>Steam engine plants characterised by the use of specific types of engine (F01K 3/02 takes precedence); Plants or engines characterised by their use of special steam systems, cycles, or processes (reciprocating-piston engines using uniflow principle F01B 17/04); Regulating means peculiar to such systems, cycles, or processes; Use of withdrawn or exhaust steam for feed-water heating</b>	13/02	• Regulating, e.g. stopping or starting
7/02	• the engines being of multiple-expansion type (the engines being only of turbine type F01K 7/16; the engines using steam of critical or over-critical pressure F01K 7/32; the engines being of extraction or non-condensing type F01K 7/34)	15/00	<b>Adaptations of steam engine plants for special use</b>
7/04	• • Regulating means peculiar thereto	15/02	• for driving vehicles, e.g. locomotives (arrangements in vehicles, <u>see</u> the relevant vehicle classes)
7/06	• the engines being of multiple-inlet-pressure type (F01K 7/02 takes precedence; the engines being only of turbine type F01K 7/16; the engines using steam of critical or over-critical pressure F01K 7/32; the engines being of extraction or non-condensing type F01K 7/34)	15/04	• • the vehicles being waterborne vessels
7/08	• • Regulating means peculiar thereto	17/00	<b>Use of steam or condensate extracted or exhausted from steam engine plant (for heating feed-water F01K 7/34; returning condensate to boiler F22D)</b>
7/10	• characterised by the engine exhaust pressure (the engines being only of turbine type F01K 7/16; the engines using steam of critical or over-critical pressure F01K 7/32; the engines being of extraction or non-condensing type F01K 7/34)	17/02	• for heating purposes, e.g. industrial, domestic (F01K 17/06 takes precedence; domestic- or space-heating systems, e.g. central-heating systems, in general F24D 1/00, F24D 3/00, F24D 9/00) [3]
7/12	• • of condensing type	17/04	• for specific purposes other than heating (F01K 17/06 takes precedence)
7/14	• • • Regulating means peculiar thereto	17/06	• Returning energy of steam, in exchanged form, to process, e.g. use of exhaust steam for drying solid fuel of plant
7/16	• the engines being only of turbine type (the engines using steam of critical or over-critical pressure F01K 7/32; the engines being of extraction or non-condensing type F01K 7/34)	19/00	<b>Regenerating or otherwise treating steam exhaust from steam engine plant (plants characterised by use of means for storing steam in an alkali to increase steam pressure F01K 5/00; returning condensate to boiler F22D)</b>
7/18	• • the turbine being of multiple-inlet-pressure type	19/02	• Regenerating by compression
7/20	• • • Regulating means peculiar thereto	19/04	• • in combination with cooling or heating
7/22	• • the turbines having inter-stage steam heating	19/06	• • in engine cylinder
7/24	• • • Regulating or safety means peculiar thereto	19/08	• • compression done by injection apparatus, jet blower, or the like
7/26	• • the turbines having inter-stage steam accumulation	19/10	• Cooling exhaust steam other than by condenser; Rendering exhaust steam invisible
7/28	• • • Regulating means peculiar thereto	21/00	<b>Steam engine plants not otherwise provided for</b>
7/30	• • the turbines using exhaust steam only	21/02	• with steam generation in engine cylinders
7/32	• the engines using steam of critical or over-critical pressure	21/04	• using mixtures of steam and gas; Plants generating or heating steam by bringing water or steam into direct contact with hot gas (direct-contact steam generators in general F22B)
7/34	• the engines being of extraction or non-condensing type; Use of steam for feed-water heating (feed-water heaters in general F22D)	21/06	• Treating live steam, other than thermodynamically, e.g. for fighting deposits in engine
7/36	• • the engines being of positive-displacement type	23/00	<b>Plants characterised by more than one engine delivering power external to the plant, the engines being driven by different fluids</b>
7/38	• • the engines being of turbine type	23/02	• the engine cycles being thermally coupled
7/40	• • Use of two or more feed-water heaters in series	23/04	• • condensation heat from one cycle heating the fluid in another cycle
7/42	• • Use of desuperheaters for feed-water heating	23/06	• • combustion heat from one cycle heating the fluid in another cycle
7/44	• • Use of steam for feed-water heating and another purpose	23/08	• • • with working fluid of one cycle heating the fluid in another cycle
9/00	<b>Steam engine plants characterised by condensers arranged or modified to co-operate with the engines (by condensers structurally combined with engines F01K 11/00; steam condensers <u>per se</u> F28B)</b>	23/10	• • • with exhaust fluid of one cycle heating the fluid in another cycle
9/02	• Arrangements or modifications of condensate or air pumps	23/12	• the engines being mechanically coupled (F01K 23/02 takes precedence)
9/04	• with dump valves to by-pass stages	23/14	• • including at least one combustion engine
11/00	<b>Steam engine plants characterised by the engines being structurally combined with boilers or condensers</b>	23/16	• • all the engines being turbines (F01K 23/14 takes precedence)
11/02	• the engines being turbines	23/18	• characterised by adaptation for specific use

**25/00 Plants or engines characterised by use of special working fluids, not otherwise provided for; Plants operating in closed cycles and not otherwise provided for**

- 25/02 • the fluid remaining in the liquid phase
- 25/04 • the fluid being in different phases, e.g. foamed
- 25/06 • using mixtures of different fluids (plants using mixtures of steam and gas F01K 21/04)
- 25/08 • using special vapours

- 25/10 • • the vapours being cold, e.g. ammonia, carbon dioxide, ether
- 25/12 • • the vapours being metallic, e.g. mercury
- 25/14 • • using industrial or other waste gases

**27/00 Plants for converting heat or fluid energy into mechanical energy, not otherwise provided for**

- 27/02 • Plants modified to use their waste heat, other than that of exhaust, e.g. engine-friction heat