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

F24 HEATING; RANGES; VENTILATING

Note(s)

In this class, the following terms are used with the meanings indicated:

- "stove" includes apparatus which may have an open fire, e.g. fireplace;
- "range" means an apparatus for cooking having elements that perform different cooking operations or cooking and heating operations.

F24B **DOMESTIC STOVES OR RANGES FOR SOLID FUELS** (for solid fuels in combination with gaseous fuels, liquid fuels or other kinds of energy supply F24C 1/02)**; IMPLEMENTS FOR USE IN CONNECTION WITH STOVES OR RANGES [6]**

1/00 **Stoves or ranges [1, 2006.01]**
1/02 • Closed stoves **[1, 2006.01]**
1/04 • • built-up from glazed tiles **[1, 2006.01, 2021.01]**
1/06 • • • Construction of tiles or bracing means therefor, e.g. shim liner **[1, 2006.01, 2021.01]**
1/08 • • with fuel storage in a single undivided hopper within stove or range **[1, 2006.01, 2021.01]**
1/10 • • • with combustion in horizontal direction (with predistillation in the hopper F24B 1/14) **[1, 2006.01, 2021.01]**
1/14 • • • with predistillation in the hopper **[1, 2006.01, 2021.01]**
1/16 • • with fuel storage in multiple or divided hoppers within the stove or range **[1, 2006.01, 2021.01]**
1/18 • Stoves with open fires, e.g. fireplaces **[1, 2006.01]**
1/181 • • Free-standing fireplaces, e.g. for mobile homes **[4, 2006.01]**
1/182 • • with additional provisions for cooking **[4, 2006.01]**
1/183 • • with additional provisions for heating water **[4, 2006.01]**
1/185 • • with air-handling means, heat exchange means, or additional provisions for convection heating (with additional provisions for heating water F24B 1/183; component parts or accessories having air-handling means, heat exchange means, or additional provisions for convection heating F24B 1/191); Controlling combustion **[4, 2006.01]**
1/187 • • • Condition responsive controls for regulating combustion **[4, 2006.01]**
1/188 • • • characterised by use of heat exchange means (condition responsive controls for regulating combustion F24B 1/187) **[4, 2006.01]**
1/189 • • • characterised by air-handling means, i.e. of combustion-air, heated-air, or flue-gases, e.g. draught control dampers (condition responsive controls for regulating combustion F24B 1/187; by use of heat exchange means F24B 1/188) **[4, 2006.01]**
1/19 • • • • Supplying combustion-air **[4, 2006.01]**
1/191 • • Component parts; Accessories **[4, 2006.01]**
1/192 • • • Doors; Screens; Fuel guards **[4, 2006.01]**
1/193 • • • Grates; Irons **[4, 2006.01]**
1/195 • • • Fireboxes; Frames; Hoods; Heat reflectors **[4, 2006.01]**
1/197 • • • Hearths **[4, 2006.01]**
1/198 • • • Surrounds-fronts **[4, 2006.01]**
1/199 • • • Fuel-handling equipment **[4, 2006.01]**
1/20 • Ranges **[1, 2006.01]**
1/22 • • in which the baking oven is arranged above the fire-box **[1, 2006.01]**
1/24 • • with built-in masses for heat storage or heat insulation **[1, 2006.01]**
1/26 • Stoves with additional provisions for cooking (stoves with open-fires with additional provisions for cooking F24B 1/182) **[1, 4, 2006.01]**
1/28 • Combined installations of stoves or ranges, e.g. back-to-back stoves with a common fire-box **[1, 2006.01]**

3/00 **Heaters not covered by group F24B 1/00, e.g. charcoal braziers [1, 2006.01]**

5/00 **Combustion-air or flue-gas circulation in or around stoves or ranges** (stoves with open fires with air-handling means F24B 1/185) **[1, 4, 2006.01]**
5/02 • in or around stoves **[1, 2006.01]**
5/04 • • the air or gas passing downwards through the bottom of the stove or fire grate **[1, 2006.01]**
5/06 • in or around ranges **[1, 2006.01]**
5/08 • • around the baking oven **[1, 2006.01]**

7/00 **Stoves, ranges, or flue-gas ducts, with additional provisions for convection heating** (stoves with open fires characterised by use of heat exchange means F24B 1/188) **[1, 4, 2006.01]**
7/02 • with external air ducts **[1, 2006.01]**
7/04 • with internal air ducts **[1, 2006.01]**
7/06 • without air ducts **[1, 2006.01]**

9/00 **Stoves, ranges, or flue-gas ducts, with additional provisions for heating water** (stoves with open fires with additional provisions for cooking F24B 1/182, for heating water F24B 1/183) **[1, 3, 4, 2006.01]**
9/02 • in open containers, e.g. bain-marie **[1, 2006.01]**
9/04 • in closed containers **[1, 4, 2006.01]**

13/00 **Details solely applicable to stoves or ranges burning solid fuels** (component parts or accessories for stoves with open-fires F24B 1/191) **[1, 4, 2006.01]**

13/02 • Arrangement or mounting of fire-grate assemblies; Arrangement or mounting of linings for fire-boxes, e.g. fire-backs **[1, 2006.01]**

13/04 • Arrangements for feeding solid fuel, e.g. hoppers **[1, 2006.01]**

15/00 **Implements for use in connection with stoves or ranges [6, 2006.01]**

15/02 • for breaking coal **[6, 2006.01]**

15/04 • Coal hods; Coal boxes **[6, 2006.01]**

15/06 • Shovels with ejectors **[6, 2006.01]**

15/08 • Shovels with sifters **[6, 2006.01]**

15/10 • Coal tongs **[6, 2006.01]**

F24C **DOMESTIC STOVES OR RANGES** (exclusively for solid fuels F24B)**; DETAILS OF DOMESTIC STOVES OR RANGES, OF GENERAL APPLICATION**

Subclass index

1/00 **Stoves or ranges in which the fuel or energy supply is not restricted to solid fuel or to a type covered by a single one of groups F24C 3/00-F24C 9/00; Stoves or ranges in which the type of fuel or energy supply is not specified [1, 2006.01]**

1/02 • adapted for the use of two or more kinds of fuel or energy supply (combinations of two or more stoves or ranges each having a different kind of fuel or energy supply F24C 11/00) **[1, 2006.01, 2021.01]**

1/04 • • simultaneously **[1, 2006.01, 2021.01]**

1/06 • • by replacing parts, e.g. replacing burners by electric heaters **[1, 2006.01, 2021.01]**

1/08 • solely adapted for radiation heating **[1, 2006.01, 2021.01]**

1/10 • • with reflectors **[1, 2006.01, 2021.01]**

1/12 • • • of circular shape **[1, 2006.01, 2021.01]**

1/14 • Radiation heating stoves or ranges, with additional provision for convection heating **[1, 2006.01, 2021.01]**

1/16 • with special adaptation for travelling, e.g. collapsible **[1, 2006.01, 2021.01]**

3/00 **Stoves or ranges for gaseous fuels** (stoves or ranges specially adapted for the use of two or more kinds of fuel or energy supply F24C 1/02) **[1, 2006.01]**

3/02 • with heat produced solely by flame **[1, 2006.01, 2021.01]**

3/04 • with heat produced wholly or partly by a radiant body, e.g. by a perforated plate **[1, 2006.01, 2021.01]**

3/06 • • without any visible flame **[1, 2006.01, 2021.01]**

3/08 • Arrangement or mounting of burners **[1, 2006.01]**

3/10 • Arrangement or mounting of ignition devices **[1, 2006.01]**

3/12 • Arrangement or mounting of control or safety devices **[1, 2006.01]**

3/14 • with special adaptation for travelling, e.g. collapsible **[1, 2006.01, 2021.01]**

5/00 **Stoves or ranges for liquid fuels** (stoves or ranges specially adapted for the use of two or more kinds of fuel or energy supply F24C 1/02) **[1, 2006.01]**

5/02 • with evaporation burners, e.g. of dish type **[1, 2006.01, 2021.01]**

5/04 • • wick type **[1, 2006.01, 2021.01]**

5/06 • • • adjustable **[1, 2006.01, 2021.01]**

5/08 • • with heat produced wholly or partly by a radiant body **[1, 2006.01, 2021.01]**

5/10 • with atomising burners **[1, 2006.01, 2021.01]**

5/12 • Arrangement or mounting of burners **[1, 2006.01]**

5/14 • Arrangement or mounting of ignition devices **[1, 2006.01]**

5/16 • Arrangement or mounting of control or safety devices **[1, 2006.01]**

5/18 • Liquid-fuel supply arrangements forming parts of stoves or ranges **[1, 2006.01]**

5/20 • with special adaptation for travelling, e.g. collapsible **[1, 2006.01, 2021.01]**

7/00 **Stoves or ranges heated by electric energy** (stoves or ranges specially adapted for the use of two or more kinds of fuel or energy supply F24C 1/02) **[1, 2006.01]**

7/02 • using microwaves **[1, 2006.01]**

7/04 • with heat radiated directly from the heating element **[1, 2006.01, 2021.01]**

7/06 • Arrangement or mounting of electric heating elements **[1, 2006.01]**

7/08 • Arrangement or mounting of control or safety devices **[1, 2006.01]**

7/10 • with special adaptation for travelling, e.g. collapsible **[1, 2006.01, 2021.01]**

9/00 **Stoves or ranges heated by a single type of energy supply not covered by groups F24C 3/00-F24C 7/00 or subclass F24B** (solar heat collectors for heating objects, e.g. solar cookers, F24S 20/30) **[1, 2006.01]**

11/00 **Combinations of two or more stoves or ranges, e.g. each having a different kind of energy supply [1, 2006.01]**

13/00 **Stoves or ranges with additional provisions for heating water [1, 3, 2006.01]**

14/00 **Stoves or ranges having self-cleaning provisions, e.g. continuous catalytic cleaning or electrostatic cleaning [3, 2006.01]**

14/02 • pyrolytic type **[3, 2006.01]**

15/00 **Details [1, 2006.01]**

15/02 • Doors specially adapted for stoves or ranges **[1, 2006.01]**

15/04 • • with transparent panels **[1, 2006.01]**

15/06 • Ornamental features, e.g. grate fronts or surrounds **[1, 2006.01]**

15/08 • Foundations or support plates; Legs or pillars; Casings; Wheels (tops, e.g. hot plates, F24C 15/10) **[1, 2006.01]**

15/10 • Tops, e.g. hot plates; Rings (cover lids or splash guards F24C 15/12; spillage trays or grooves F24C 15/14) **[1, 2006.01]**

15/12 • Side rests; Side plates; Cover lids; Splash guards; Racks outside ovens, e.g. for drying plates **[1, 2006.01]**

15/14 • Spillage trays or grooves **[1, 2006.01]**

15/16 • Shelves, racks or trays inside ovens; Supports therefor **[1, 2006.01]**

15/18 • Arrangement of compartments additional to cooking compartments, e.g. for warming or for storing utensils or fuel containers; Arrangement of additional heating or cooking apparatus, e.g. grills **[1, 2006.01]**

15/20 • Removing cooking fumes (parts, details or accessories of cooking-vessels for withdrawing or condensing cooking vapours from such vessels A47J 36/38) **[1, 5, 2006.01]**

15/22 • Reflectors for radiation heaters **[1, 2006.01]**

15/24 • Radiant bodies or panels for radiation heaters (radiant gas burners F23D 14/12) **[1, 2006.01]**

15/26 • Handles for carrying **[1, 2006.01]**

15/28 • Draught shields **[1, 2006.01]**

15/30 • Arrangements for mounting stoves or ranges in particular locations **[1, 2006.01]**

15/32 • Arrangements of ducts for hot gases, e.g. in or around baking ovens **[1, 2006.01]**

15/34 • Elements or arrangements for heat storage or insulation **[1, 2006.01]**

15/36 • Protective guards, e.g. for preventing access to heated parts **[1, 2006.01]**

F24D **DOMESTIC- OR SPACE-HEATING SYSTEMS, e.g. CENTRAL HEATING SYSTEMS; DOMESTIC HOT-WATER SUPPLY SYSTEMS; ELEMENTS OR COMPONENTS THEREFOR** (using steam or condensate extracted or exhausted from steam engine plants for heating purposes F01K 17/02)

Note(s) [5]

In this subclass, the following expression is used with the meaning indicated:

- "central heating system" means a system in which heat is generated or stored at central sources and is distributed by means of a transfer fluid to the spaces or areas to be heated.

Subclass index

Central heating systems

1/00 **Steam central heating systems** (district heating systems F24D 10/00; central heating systems using heat accumulated in storage masses F24D 11/00) **[1, 2006.01, 2022.01]**

1/02 • operating with live steam **[1, 2006.01]**

1/04 • operating with exhaust steam **[1, 2006.01]**

1/06 • operating with superheated steam **[1, 2006.01]**

1/08 • Feed-line arrangements, e.g. providing for one-pipe system **[1, 2006.01]**

3/00 **Hot-water central heating systems** (district heating systems F24D 10/00; central heating systems using heat accumulated in storage masses F24D 11/00) **[1, 2006.01, 2022.01]**

3/02 • with forced circulation, e.g. by pumps **[1, 2006.01]**

3/04 • with the water under high pressure **[1, 2006.01]**

3/06 • • Arrangements or devices for maintaining high pressure **[1, 2006.01]**

3/08 • in combination with systems for domestic hot-water supply **[1, 2006.01]**

3/10 • Feed-line arrangements, e.g. providing for heat-accumulator tanks, expansion tanks **[1, 2006.01]**

3/12 • Tube and panel arrangements for ceiling, wall, or underfloor heating (electric underfloor heating F24D 13/02) **[4, 2006.01]**

3/14 • • incorporated in a ceiling, wall or floor **[4, 2006.01]**

3/16 • • mounted on, or adjacent to, a ceiling, wall or floor **[4, 2006.01]**

3/18 • using heat pumps **[5, 2006.01]**

5/00 **Hot-air central heating systems** (district heating systems F24D 10/00; central heating systems using heat accumulated in storage masses F24D 11/00; air conditioning F24F)**; Exhaust-gas central heating systems [1, 2006.01, 2022.01]**

5/02 • operating with discharge of hot air into the space or area to be heated **[1, 2006.01]**

5/04 • • with return of the air to the air heater **[1, 2006.01]**

5/06 • operating without discharge of hot air into the space or area to be heated **[1, 2006.01]**

5/08 • • with hot air led through radiators **[1, 2006.01]**

5/10 • • with hot air led through heat-exchange ducts in the walls, floor, or ceiling **[1, 2006.01]**

5/12 • using heat pumps **[5, 2006.01]**

7/00 **Central heating systems employing heat-transfer fluids not covered by groups F24D 1/00-F24D 5/00, e.g. oil, salt or gas** (district heating systems F24D 10/00; central heating systems using heat accumulated in storage masses F24D 11/00) **[1, 2006.01, 2022.01]**

9/00 **Central heating systems employing combinations of heat-transfer fluids covered by two or more of groups F24D 1/00-F24D 7/00** (district heating systems F24D 10/00; central heating systems using heat accumulated in storage masses F24D 11/00) **[1, 2006.01, 2022.01]**

9/02 • Hot water and steam systems **[1, 2006.01]**

10/00 **District heating systems [5, 2006.01, 2022.01]**

11/00 **Central heating systems using heat accumulated in storage masses** (self-contained storage heating units F24D 15/02) **[1, 2006.01, 2022.01]**

11/02 • using heat pumps **[1, 2006.01]**

12/00 **Other central heating systems [1, 2006.01]**

12/02 • having more than one heat source (using heat pumps, in water central heating systems F24D 3/18; in air central heating systems F24D 5/12; in systems using heat storage masses F24D 11/02) **[5, 2006.01]**

Other domestic- or space-heating systems

13/00 **Electric heating systems [1, 2006.01]**

13/02 • solely using resistance heating, e.g. underfloor heating **[1, 2006.01]**

13/04 • using electric heating of heat-transfer fluid in separate units of the system **[1, 2006.01]**

15/00 **Other domestic- or space-heating systems [1, 2006.01, 2022.01]**

15/02 • consisting of self-contained heating units, e.g. storage heaters **[3, 2006.01]**

15/04 • using heat pumps **[5, 2006.01]**

17/00 **Domestic hot-water supply systems [1, 2006.01, 2022.01]**

17/02 • using heat pumps **[5, 2006.01]**

18/00 **Small-scale combined heat and power [CHP] generation systems specially adapted for domestic heating, space heating or domestic hot-water supply [2022.01]**

Note(s) [2022.01]

In this group, it is desirable to add the indexing codes of groups F24D 101/00-F24D 105/00.

19/00 **Details** (of water or air heaters F24H 9/00; of heat-exchange or heat-transfer apparatus, of general application F28F) **[3, 2006.01]**

19/02 • Arrangement of mountings or supports for radiators **[3, 2006.01]**

19/04 • • in skirtings **[3, 2006.01]**

19/06 • Casings, cover lids or ornamental panels, for radiators **[3, 2006.01]**

19/08 • Arrangements for drainage, venting or aerating (valves for venting or aerating F16K 24/00) **[3, 2006.01]**

19/10 • Arrangement or mounting of control or safety devices (only the heater being controlled F24H 9/20) **[3, 2006.01]**

Indexing scheme associated with group F24D 18/00, relating to electric generators, thermal aspects and constructional aspects of small-scale combined heat and power [CHP] systems [2022.01]

101/00 **Electric generators of small-scale CHP systems [2022.01]**

101/10 • Gas turbines; Steam engines or steam turbines; Water turbines, e.g. located in water pipes **[2022.01]**

101/20 • Wind turbines **[2022.01]**

101/30 • Fuel cells **[2022.01]**

101/40 • Photovoltaic [PV] modules **[2022.01]**

101/50 • Thermophotovoltaic [TPV] modules **[2022.01]**

101/60 • Thermoelectric generators, e.g. Peltier or Seebeck elements **[2022.01]**

101/70 • Electric generators driven by internal combustion engines [ICE] **[2022.01]**

101/80 • Electric generators driven by external combustion engines, e.g. Stirling engines **[2022.01]**

103/00 **Thermal aspects of small-scale CHP systems [2022.01]**

103/10 • Small-scale CHP systems characterised by their heat recovery units **[2022.01]**

103/13 • • characterised by their heat exchangers **[2022.01]**

103/17 • • Storage tanks **[2022.01]**

103/20 • Additional heat sources for supporting thermal peak loads **[2022.01]**

105/00 **Constructional aspects of small-scale CHP systems [2022.01]**

105/10 • Sound insulation **[2022.01]**

F24F AIR-CONDITIONING; AIR-HUMIDIFICATION; VENTILATION; USE OF AIR CURRENTS FOR SCREENING (removing dirt or fumes from areas where they are produced B08B 15/00; vertical ducts for carrying away waste gases from buildings E04F 17/02; tops for chimneys or ventilating shafts, terminals for flues F23L 17/02)

Note(s) [3]

1. This subclass covers treatment, e.g. purification, of air supplied to human living or working spaces in air conditioning systems or in room units.
2. In this subclass:
   - air-humidification as auxiliary treatment in air-conditioning, i.e. in units wherein the air is also either cooled or heated, is covered by groups F24F 1/00 or F24F 3/14;
   - air-humidification per se, e.g. "room humidifiers", is covered by group F24F 6/00.
3. In this subclass, the following terms or expressions are used with the meanings indicated:
   - "air-conditioning" means the supply of air to or the treatment of air in rooms or spaces by means of cooling or a combination of cooling and a further kind of air treatment, e.g. humidification, heating or air purification;
   - "ventilation" means the supply of air to, or its extraction from, rooms or spaces, and systems for circulating air within rooms or spaces, but does not cover the mere treatment of air being supplied to, extracted from, or circulated within, rooms or spaces.
4. In this subclass, control or safety arrangements are classified in group F24F 11/00. In order to indicate the type of air-treatment system in which these arrangements are used, further classification may be made in groups F24F 1/00-F24F 9/00.

Subclass index

1/00 Room units for air-conditioning, e.g. separate or self-contained units or units receiving primary air from a central station [1, 2006.01, 2011.01, 2019.01]

1/0003 • characterised by a split arrangement, wherein parts of the air-conditioning system, e.g. evaporator and condenser, are in separately located units **[2019.01]**

1/0007 • Indoor units, e.g. fan coil units (self-contained units F24F 1/02) **[2019.01]**

1/0011 • • characterised by air outlets **[2019.01]**

1/0014 • • • having two or more outlet openings **[2019.01]**

1/0018 • • characterised by fans (with secondary air induced by injector action of the primary air F24F 1/01) **[2019.01]**

1/0022 • • • Centrifugal or radial fans **[2019.01]**

1/0025 • • • Cross-flow or tangential fans **[2019.01]**

1/0029 • • • Axial fans **[2019.01]**

1/0033 • • • having two or more fans **[2019.01]**

1/0035 • • characterised by introduction of outside air to the room **[2019.01]**

1/0038 • • • in combination with simultaneous exhaustion of inside air **[2019.01]**

1/0041 • • characterised by exhaustion of inside air from the room (in combination with simultaneous introduction of outside air F24F 1/0038) **[2019.01]**

1/0043 • • characterised by mounting arrangements **[2019.01]**

1/0047 • • • mounted in the ceiling or at the ceiling **[2019.01]**

1/005 • • • mounted on the floor; standing on the floor **[2019.01]**

1/0053 • • • mounted at least partially below the floor; with air distribution below the floor **[2019.01]**

1/0057 • • • mounted in or on a wall **[2019.01]**

1/0059 • • characterised by heat exchangers **[2019.01]**

1/0063 • • • by the mounting or arrangement of the heat exchangers **[2019.01]**

1/0067 • • • by the shape of the heat exchangers or of parts thereof, e.g. of their fins **[2019.01]**

1/0068 • • characterised by the arrangement of refrigerant piping outside the heat exchanger within the unit casing **[2019.01]**

1/0071 • • with means for purifying supplied air (perfuming or deodorising means F24F 1/008) **[2019.01]**

1/0073 • • • characterised by the mounting or arrangement of filters **[2019.01]**

1/0076 • • • by electric means, e.g. ionisers or electrostatic separators **[2019.01]**

1/008 • • with perfuming or deodorising means **[2019.01]**

1/0083 • • with dehumidification means **[2019.01]**

1/0087 • • with humidification means **[2019.01]**

1/009 • • characterised by heating arrangements (characterised by heat exchangers F24F 1/0059) **[2019.01]**

1/0093 • • • with additional radiant heat-discharging elements, e.g. electric heaters **[2019.01]**

1/0097 • • • using thermoelectric or thermomagnetic means, e.g. Peltier elements **[2019.01]**

1/01 • in which secondary air is induced by injector action of the primary air **[3, 2006.01, 2011.01]**

1/02 • Self-contained room units for air-conditioning, i.e. with all apparatus for treatment installed in a common casing **[1, 2006.01, 2011.01, 2019.01]**

1/022 • • comprising a compressor cycle **[2019.01]**

1/027 • • • mounted in wall openings, e.g. in windows **[2019.01]**

1/028 • • characterised by air supply means, e.g. fan casings, internal dampers or ducts (with secondary air induced by injector action of the primary air F24F 1/01) **[2019.01]**
1/0284 • • • with horizontally arranged fan axis **[2019.01]**
1/0287 • • • with vertically arranged fan axis **[2019.01]**
1/029 • • characterised by the layout or mutual arrangement of components, e.g. of compressors or fans **[2019.01]**
1/03 • • characterised by mounting arrangements **[2019.01]**
1/031 • • • penetrating a wall or window **[2019.01]**
1/0314 • • • mounted on a wall **[2019.01]**
1/0317 • • • suspended from the ceiling **[2019.01]**
1/032 • • characterised by heat exchangers **[2019.01]**
1/0323 • • • by the mounting or arrangement of the heat exchangers **[2019.01]**
1/0325 • • • by the shape of the heat exchangers or of parts thereof, e.g. of their fins **[2019.01]**
1/0326 • • characterised by the arrangement of refrigerant piping outside the heat exchanger within the unit casing **[2019.01]**
1/0328 • • with means for purifying supplied air (perfuming or deodorising means F24F 1/0355) **[2019.01]**
1/035 • • • characterised by the mounting or arrangement of filters **[2019.01]**
1/0353 • • • by electric means, e.g. ionisers or electrostatic separators **[2019.01]**
1/0355 • • with perfuming or deodorising means **[2019.01]**
1/0358 • • with dehumidification means **[2019.01]**
1/037 • • with humidification means **[2019.01]**
1/0373 • • characterised by heating arrangements (characterised by heat exchangers F24F 1/032) **[2019.01]**
1/0375 • • • with additional radiant heat-discharging elements, e.g. electric heaters **[2019.01]**
1/0378 • • • using thermoelectric or thermomagnetic means, e.g. Peltier elements **[2019.01]**
1/039 • • using water to enhance cooling, e.g. spraying onto condensers **[2019.01]**
1/04 • • Arrangements for portability **[1, 2006.01, 2011.01]**
1/06 • Separate outdoor units, e.g. outdoor unit to be linked to a separate room unit comprising a compressor and a heat exchanger **[2011.01]**

Note(s) [2011.01]

In this group, the first place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.

1/08 • • Compressors specially adapted for separate outdoor units **[2011.01]**
1/10 • • • Arrangement or mounting thereof **[2011.01]**
1/12 • • • Vibration or noise prevention therefor **[2011.01]**
1/14 • • Heat exchangers specially adapted for separate outdoor units **[2011.01]**
1/16 • • • Arrangement or mounting thereof **[2011.01]**
1/18 • • • characterised by their shape **[2011.01]**
1/20 • • Electric components for separate outdoor units **[2011.01]**
1/22 • • • Arrangement or mounting thereof **[2011.01]**
1/24 • • • Cooling of electric components **[2011.01]**
1/26 • • Refrigerant piping **[2011.01]**
1/28 • • • for connecting several separate outdoor units **[2011.01]**
1/30 • • • for use inside the separate outdoor units **[2011.01]**
1/32 • • • for connecting the separate outdoor unit to indoor units **[2011.01]**
1/34 • • • Protection means therefor, e.g. covers for refrigerant pipes **[2011.01]**
1/36 • • Drip trays for outdoor units **[2011.01]**
1/38 • • Fan details of outdoor units, e.g. bell-mouth shaped inlets or fan mountings **[2011.01]**
1/40 • • Vibration or noise prevention at outdoor units (for outdoor unit compressors F24F 1/12) **[2011.01]**
1/42 • • characterised by the use of the condensate, e.g. for enhanced cooling **[2011.01]**
1/44 • • characterised by the use of internal combustion engines **[2011.01]**
1/46 • • Component arrangements in separate outdoor units **[2011.01]**
1/48 • • • characterised by airflow, e.g. inlet or outlet airflow **[2011.01]**
1/50 • • • • with outlet air in upward direction **[2011.01]**
1/52 • • • • Inlet and outlet arranged on the same side, e.g. for mounting in a wall opening **[2011.01]**
1/54 • • • • Inlet and outlet arranged on opposite sides **[2011.01]**
1/56 • • Casing or covers of separate outdoor units, e.g. fan guards **[2011.01]**
1/58 • • • Separate protective covers for outdoor units, e.g. solar guards, snow shields or camouflage **[2011.01]**
1/60 • • Arrangement or mounting of the outdoor unit **[2011.01]**
1/62 • • • Wall-mounted **[2011.01]**
1/64 • • • Ceiling-mounted, e.g. below a balcony **[2011.01]**
1/66 • • • under the floor level **[2011.01]**
1/68 • • • Arrangement of multiple separate outdoor units **[2011.01]**

3/00 Air-conditioning systems in which conditioned primary air is supplied from one or more central stations to distributing units in the rooms or spaces where it may receive secondary treatment; Apparatus specially designed for such systems (room units F24F 1/00) **[1, 2006.01]**

3/02 • characterised by the pressure or velocity of the primary air **[1, 3, 2006.01]**
3/04 • • operating with high pressure or high velocity **[1, 2006.01]**
3/044 • Systems in which all treatment is given in the central station, i.e. all-air systems **[3, 2006.01]**
3/048 • • with temperature control at constant rate of air-flow **[3, 2006.01]**
3/052 • • • Multiple duct systems, e.g. systems in which hot and cold air are supplied by separate circuits from the central station to mixing chambers in the spaces to be conditioned **[3, 2006.01]**
3/056 • • the air at least partially flowing over lighting fixtures, the heat of which is dissipated or used (outlets for directing or distributing air into rooms or spaces combined with lighting fixtures F24F 13/078) **[3, 2006.01]**
3/06 • characterised by the arrangements for the supply of heat-exchange fluid for the subsequent treatment of primary air in the room units **[1, 2006.01]**

3/08 • • with separate supply and return lines for hot and cold heat-exchange fluids **[1, 2006.01]**
3/10 • • with separate supply lines and common return line for hot and cold heat-exchange fluids **[1, 2006.01]**
3/12 • characterised by the treatment of the air otherwise than by heating and cooling **[1, 2006.01]**
3/14 • • by humidification; by dehumidification **[1, 2006.01]**
3/147 • • • with both heat and humidity transfer between supplied and exhausted air **[3, 2006.01]**
3/153 • • • with subsequent heating, i.e. with the air, given the required humidity in the central station, passing a heating element to achieve the required temperature **[3, 2006.01]**
3/16 • • by purification, e.g. by filtering; by sterilisation; by ozonisation **[1, 2006.01, 2021.01]**
3/163 • • • Clean air work stations, i.e. selected areas within a space to which filtered air is passed **[2021.01]**
3/167 • • • Clean rooms, i.e. enclosed spaces in which a uniform flow of filtered air is distributed (air distribution by perforated walls F24F 7/10) **[2021.01]**

5/00 Air-conditioning systems or apparatus not covered by group F24F 1/00 or F24F 3/00 [1, 2006.01]

6/00 Air-humidification [3, 2006.01]
6/02 • by evaporation of water in the air **[3, 2006.01]**
6/04 • • using stationary unheated wet elements **[3, 2006.01]**
6/06 • • using moving unheated wet elements **[3, 2006.01]**
6/08 • • using heated wet elements **[3, 2006.01]**
6/10 • • • heated electrically **[3, 2006.01]**
6/12 • by forming water dispersions in the air **[3, 2006.01]**
6/14 • • using nozzles **[3, 2006.01]**
6/16 • • using rotating elements **[3, 2006.01]**
6/18 • by injection of steam into the air **[3, 2006.01]**

7/00 Ventilation [1, 2006.01, 2021.01]
7/003 • in combination with air cleaning **[2021.01]**
7/007 • with forced flow (using ducting systems F24F 7/06) **[3, 2006.01]**
7/013 • • using wall or window fans, displacing air through the wall or window **[3, 2006.01]**
7/02 • Roof ventilation (ventilation of roof coverings E04D) **[1, 3, 6, 2006.01]**
7/04 • with ducting systems **[1, 2006.01]**
7/06 • • with forced air circulation, e.g. by fan **[1, 2006.01]**
7/08 • • • with separate ducts for supplied and exhausted air **[3, 2006.01]**
7/10 • • • with air supply, or exhaust, through perforated wall, floor or ceiling (outlet members for directing or distributing air F24F 13/06) **[3, 2006.01]**

8/00 Treatment, e.g. purification, of air supplied to human living or working spaces otherwise than by heating, cooling, humidifying or drying [2021.01]
8/10 • by separation, e.g. by filtering **[2021.01]**
8/108 • • using dry filter elements **[2021.01]**
8/117 • • using wet filtering **[2021.01]**
8/125 • • • using wet filter elements **[2021.01]**
8/133 • • • by direct contact with liquid, e.g. with sprayed liquid **[2021.01]**
8/142 • • • Treatment of used liquid, e.g. cleaning for recycling **[2021.01]**
8/15 • • by chemical means **[2021.01]**
8/158 • • • using active carbon **[2021.01]**
8/167 • • • using catalytic reactions **[2021.01]**
8/175 • • using biological materials, plants or microorganisms **[2021.01]**
8/183 • • by centrifugal separation, e.g. using vortices **[2021.01]**
8/192 • • by electrical means, e.g. by applying electrostatic fields or high voltages **[2021.01]**
8/20 • by sterilisation **[2021.01]**
8/22 • • using UV light **[2021.01]**
8/24 • • using sterilising media **[2021.01]**
8/26 • • • using ozone **[2021.01]**
8/28 • • specially adapted for combatting or avoiding Legionella bacteria **[2021.01]**
8/30 • by ionisation **[2021.01]**
8/40 • by ozonisation (for sterilisation F24F 8/26) **[2021.01]**
8/50 • by odorisation **[2021.01]**
8/60 • by adding oxygen **[2021.01]**
8/70 • by removing radon **[2021.01]**
8/80 • Self-contained air purifiers **[2021.01]**
8/90 • Cleaning of purification apparatus **[2021.01]**
8/95 • specially adapted for specific purposes **[2021.01]**
8/96 • • for removing pollen **[2021.01]**
8/97 • • for removing tobacco smoke **[2021.01]**
8/98 • • for removing ozone **[2021.01]**
8/99 • • for treating air sourced from urban areas, e.g. from streets **[2021.01]**

9/00 Use of air currents for screening, e.g. air curtains [1, 2006.01]

11/00 Control or safety arrangements [1, 3, 2006.01, 2018.01]

Note(s) [2018.01]

In this group, it is desirable to add the indexing codes of groups F24F 110/00-F24F 140/00.

11/30 • for purposes related to the operation of the system, e.g. for safety or monitoring **[2018.01]**
11/32 • • Responding to malfunctions or emergencies **[2018.01]**
11/33 • • • to fire, excessive heat or smoke **[2018.01]**
11/34 • • • • by opening air passages **[2018.01]**
11/35 • • • • by closing air passages **[2018.01]**
11/36 • • • to leakage of heat-exchange fluid **[2018.01]**
11/37 • • • Resuming operation, e.g. after power outages; Emergency starting **[2018.01]**
11/38 • • • Failure diagnosis **[2018.01]**
11/39 • • • Monitoring filter performance **[2018.01]**
11/41 • • Defrosting; Preventing freezing **[2018.01]**
11/42 • • • of outdoor units **[2018.01]**
11/43 • • • of indoor units **[2018.01]**
11/46 • • Improving electric energy efficiency or saving **[2018.01]**
11/47 • • • Responding to energy costs **[2018.01]**
11/48 • • prior to normal operation, e.g. pre-heating or pre-cooling **[2018.01]**
11/49 • • ensuring correct operation, e.g. by trial operation or configuration checks **[2018.01]**
11/50 • characterised by user interfaces or communication **[2018.01]**
11/52 • • Indication arrangements, e.g. displays **[2018.01]**
11/523 • • • for displaying temperature data **[2018.01]**
11/526 • • • giving audible indications **[2018.01]**

11/54 • • using one central controller connected to several sub-controllers **[2018.01]**
11/56 • • Remote control **[2018.01]**
11/57 • • • using telephone networks **[2018.01]**
11/58 • • • using Internet communication **[2018.01]**
11/59 • • • for presetting **[2018.01]**
11/61 • • using timers **[2018.01]**
11/62 • characterised by the type of control or by internal processing, e.g. using fuzzy logic, adaptive control or estimation of values **[2018.01]**
11/63 • • Electronic processing **[2018.01]**
11/64 • • • using pre-stored data **[2018.01]**
11/65 • • • for selecting an operating mode **[2018.01]**
11/66 • • • • Sleep mode **[2018.01]**
11/67 • • • • Switching between heating and cooling modes **[2018.01]**
11/70 • Control systems characterised by their outputs; Constructional details thereof **[2018.01]**
11/72 • • for controlling the supply of treated air, e.g. its pressure **[2018.01]**
11/74 • • • for controlling air flow rate or air velocity **[2018.01]**
11/75 • • • • for maintaining constant air flow rate or air velocity **[2018.01]**
11/755 • • • • for cyclical variation of air flow rate or air velocity **[2018.01]**
11/76 • • • • by means responsive to temperature, e.g. bimetal springs **[2018.01]**
11/77 • • • • by controlling the speed of ventilators **[2018.01]**
11/79 • • • for controlling the direction of the supplied air **[2018.01]**
11/80 • • for controlling the temperature of the supplied air **[2018.01]**
11/81 • • • by controlling the air supply to heat-exchangers or bypass channels **[2018.01]**
11/83 • • • by controlling the supply of heat-exchange fluids to heat-exchangers **[2018.01]**
11/84 • • • • using valves **[2018.01]**
11/85 • • • • using variable-flow pumps **[2018.01]**
11/86 • • • by controlling compressors within refrigeration or heat pump circuits **[2018.01]**
11/87 • • • by controlling absorption or discharge of heat in outdoor units **[2018.01]**
11/871 • • • • by controlling outdoor fans **[2018.01]**
11/873 • • • by controlling refrigerant heaters **[2018.01]**
11/875 • • • by controlling heat-storage apparatus **[2018.01]**
11/88 • Electrical aspects, e.g. circuits **[2018.01]**
11/89 • Arrangement or mounting of control or safety devices **[2018.01]**

12/00 Use of energy recovery systems in air conditioning, ventilation or screening (with both heat and humidity transfer between supplied and exhausted air F24F 3/147) **[4, 2006.01]**

13/00 Details common to, or for air-conditioning, air-humidification, ventilation or use of air currents for screening [1, 2006.01]

13/02 • Ducting arrangements **[1, 2006.01]**
13/04 • • Air-mixing units (F24F 13/06 takes precedence) **[1, 2006.01]**
13/06 • • Outlets for directing or distributing air into rooms or spaces, e.g. ceiling air diffuser **[1, 2006.01]**
13/062 • • • having one or more bowls or cones diverging in the flow direction **[3, 2006.01]**
13/065 • • • formed as cylindrical or spherical bodies which are rotatable **[3, 2006.01]**
13/068 • • • formed as perforated walls, ceilings or floors (F24F 13/078 takes precedence) **[3, 2006.01]**
13/072 • • • of elongated shape, e.g. between ceiling panels **[3, 2006.01]**
13/075 • • • having parallel rods or lamellae directing the outflow, e.g. the rods or lamellae being individually adjustable (F24F 13/072 takes precedence) **[3, 2006.01]**
13/078 • • • combined with lighting fixtures **[3, 2006.01]**
13/08 • Air-flow control members, e.g. louvres, grilles, flaps or guide plates (F24F 7/013, F24F 13/06 take precedence) **[1, 3, 2006.01]**
13/10 • • movable, e.g. dampers **[1, 2006.01]**
13/12 • • • built-up of sliding members **[1, 2006.01]**
13/14 • • • built-up of tilting members, e.g. louvre **[1, 2006.01]**
13/15 • • • • with parallel simultaneously tiltable lamellae **[3, 2006.01]**
13/16 • • • built-up of parallelly-movable plates **[1, 2006.01]**
13/18 • • specially adapted for insertion in flat panels, e.g. in door or window-pane **[1, 2006.01]**
13/20 • Casings or covers **[5, 2006.01]**
13/22 • Means for preventing condensation or evacuating condensate **[5, 2006.01]**
13/24 • Means for preventing or suppressing noise **[5, 2006.01]**
13/26 • Arrangements for air-circulation by means of induction, e.g. by fluid coupling or thermal effect **[6, 2006.01]**
13/28 • Arrangement or mounting of filters **[6, 2006.01]**
13/30 • Arrangement or mounting of heat-exchangers **[6, 2006.01]**
13/32 • Supports for air-conditioning, air-humidification or ventilation units **[6, 2006.01]**

Indexing scheme associated with group F24F 11/00, relating to control inputs, e.g. measured or estimated values or parameters [2018.01]

110/00 Control inputs relating to air properties [2018.01]
110/10 • Temperature **[2018.01]**
110/12 • • of the outside air **[2018.01]**
110/20 • Humidity **[2018.01]**
110/22 • • of the outside air **[2018.01]**
110/30 • Velocity **[2018.01]**
110/32 • • of the outside air **[2018.01]**
110/40 • Pressure, e.g. wind pressure **[2018.01]**
110/50 • Air quality properties **[2018.01]**
110/52 • • of the outside air **[2018.01]**
110/60 • • Odour **[2018.01]**
110/62 • • Tobacco smoke **[2018.01]**
110/64 • • Airborne particle content **[2018.01]**
110/65 • • Concentration of specific substances or contaminants **[2018.01]**
110/66 • • • Volatile organic compounds [VOC] **[2018.01]**
110/68 • • • Radon **[2018.01]**
110/70 • • • Carbon dioxide **[2018.01]**
110/72 • • • Carbon monoxide **[2018.01]**
110/74 • • • Ozone **[2018.01]**
110/76 • • • Oxygen **[2018.01]**
110/80 • • Electric charge **[2018.01]**

120/00 Control inputs relating to users or occupants [2018.01]
120/10 • Occupancy **[2018.01]**
120/12 • • Position of occupants **[2018.01]**
120/14 • • Activity of occupants **[2018.01]**
120/20 • Feedback from users **[2018.01]**

130/00 Control inputs relating to environmental factors not covered by group F24F 110/00 [2018.01]
130/10 • Weather information or forecasts **[2018.01]**
130/20 • Sunlight **[2018.01]**
130/30 • Artificial light **[2018.01]**
130/40 • Noise **[2018.01]**

140/00 Control inputs relating to system states [2018.01]
140/10 • Pressure **[2018.01]**
140/12 • • Heat-exchange fluid pressure **[2018.01]**
140/20 • Heat-exchange fluid temperature **[2018.01]**
140/30 • Condensation of water from cooled air **[2018.01]**
140/40 • Damper positions, e.g. open or closed **[2018.01]**
140/50 • Load **[2018.01]**
140/60 • Energy consumption **[2018.01]**

F24H FLUID HEATERS, e.g. WATER OR AIR HEATERS, HAVING HEAT-GENERATING MEANS, e.g. HEAT PUMPS, IN GENERAL (steam generation F22)

Note(s) [3]

1. The distinguishing feature of the air heaters covered by this subclass is that the heat is predominantly released to the air by convection, mostly by forced circulation of the air. The domestic stoves or ranges covered by subclass F24B, F24C may also be fired or electric air heaters but they release their heat to a considerable extent by radiation and only to some extent by natural convention.
2. In this subclass, the following terms or expressions are used with the meanings indicated:
   - "water" includes other liquids and means always the liquid to be heated;
   - "air" includes other gases or gas mixtures and means always the gas to be heated;
   - "furnace tubes" means tubes inside the heater wherein combustion is performed;
   - "fire tubes" means tubes inside the heater through which flue-gases flow from a combustion chamber located outside the tubes;
   - "heater" means apparatus including both heat generating means and means for transferring the generated heat to water or air.
3. All storage heaters are classified in group F24H 7/00.

Subclass index

1/00 Water heaters, e.g. boilers, continuous-flow heaters or water-storage heaters (steam boilers F22B) **[1, 5, 2006.01, 2022.01]**
1/06 • Portable or mobile, e.g. collapsible **[1, 2006.01, 2022.01]**
1/08 • Packaged or self-contained boilers, i.e. water heaters with control devices and pump in a single unit **[1, 2006.01, 2022.01]**
1/10 • Continuous-flow heaters, i.e. heaters in which heat is generated only while the water is flowing, e.g. with direct contact of the water with the heating medium **[1, 5, 2006.01, 2022.01]**
1/12 • • in which the water is kept separate from the heating medium **[1, 2006.01, 2022.01]**
1/14 • • • by tubes, e.g. bent in serpentine form **[1, 2006.01, 2022.01]**
1/16 • • • • helically or spirally coiled **[1, 2006.01, 2022.01]**
1/18 • Water-storage heaters **[1, 5, 2006.01, 2022.01]**
1/20 • • with immersed heating elements, e.g. electric elements or furnace tubes **[1, 2006.01, 2022.01]**
1/22 • Water heaters other than continuous-flow or water-storage heaters, e.g. water heaters for central heating **[1, 5, 2006.01, 2022.01]**
1/24 • • with water mantle surrounding the combustion chamber or chambers **[1, 3, 2006.01, 2022.01]**
1/26 • • • the water mantle forming an integral body **[1, 2006.01, 2022.01]**
1/28 • • • • • including one or more furnace or fire tubes **[1, 2006.01, 2022.01]**
1/30 • • • the water mantle being built-up from sections **[1, 2006.01, 2022.01]**
1/32 • • • • • with vertical sections arranged side by side **[1, 2006.01, 2022.01]**
1/34 • • with water chamber arranged adjacent to the combustion chamber or chambers, e.g. above or at side **[1, 2006.01, 2022.01]**
1/36 • • • the water chamber including one or more fire tubes **[1, 2006.01, 2022.01]**
1/38 • • with water contained in separate elements, e.g. radiator-type element **[1, 2006.01, 2022.01]**
1/40 • • with water tube or tubes **[1, 2006.01, 2022.01]**
1/41 • • • in serpentine form **[3, 2006.01, 2022.01]**
1/43 • • • helically or spirally coiled **[3, 2006.01, 2022.01]**
1/44 • • with combinations of two or more of the types covered by groups F24H 1/24-F24H 1/40 **[1, 2006.01, 2022.01]**

1/46 • Water heaters having plural combustion chambers **[1, 2, 5, 2006.01, 2022.01]**
1/48 • Water heaters for central heating incorporating heaters for domestic water **[5, 2006.01, 2022.01]**
1/50 • • incorporating domestic water tanks **[5, 2006.01, 2022.01]**
1/52 • • incorporating heat exchangers for domestic water (F24H 1/50 takes precedence) **[5, 2006.01, 2022.01]**
1/54 • Water heaters for bathtubs or pools; Water heaters for reheating the water in bathtubs or pools **[2022.01]**

3/00 Air heaters [1, 5, 2006.01, 2022.01]
3/02 • with forced circulation **[1, 2006.01, 2022.01]**
3/04 • • the air being in direct contact with the heating medium, e.g. electric heating element **[1, 2006.01, 2022.01]**
3/06 • • the air being kept separate from the heating medium, e.g. using forced circulation of air over radiators **[1, 2006.01, 2022.01]**
3/08 • • • by tubes **[1, 2006.01, 2022.01]**
3/10 • • • by plates **[1, 2006.01, 2022.01]**
3/12 • with additional heating arrangements **[1, 2006.01, 2022.01]**

4/00 Fluid heaters characterised by the use of heat pumps [5, 2006.01]
4/02 • Water heaters **[5, 2006.01, 2022.01]**
4/04 • • Storage heaters **[5, 2006.01]**
4/06 • Air heaters **[5, 2006.01]**

6/00 Combined water and air heaters [1, 5, 2006.01, 2022.01]

7/00 Storage heaters, i.e. heaters in which the energy is stored as heat in masses for subsequent release [1, 2006.01, 2022.01]
7/02 • the released heat being conveyed to a transfer fluid **[1, 2006.01, 2022.01]**
7/04 • • with forced circulation of the transfer fluid **[1, 2006.01]**
7/06 • the released heat being radiated **[1, 2006.01]**

8/00 Fluid heaters characterised by means for extracting latent heat from flue gases by means of condensation [5, 2006.01, 2022.01]

9/00 Details [1, 2006.01, 2022.01]
9/02 • Casings; Cover lids; Ornamental panels **[1, 2006.01]**
9/06 • Arrangement of mountings or supports **[1, 2006.01]**
9/12 • Arrangements for connecting heaters to circulation pipes **[1, 2006.01, 2022.01]**
9/13 • • for water heaters **[2022.01]**
9/14 • Arrangements for connecting different sections, e.g. in water heaters (arrangements for connecting heaters to circulation pipes F24H 9/12) **[1, 2006.01]**
9/16 • Arrangements for water drainage **[1, 2006.01, 2022.01]**
9/17 • • Means for retaining water leaked from heaters **[2022.01]**
9/18 • Arrangement or mounting of grates or heating means **[1, 2006.01, 2022.01]**
9/1809 • • for water heaters **[2022.01]**
9/1818 • • • Arrangement or mounting of electric heating means **[2022.01]**
9/1832 • • • Arrangement or mounting of combustion heating means, e.g. grates or burners **[2022.01]**
9/1836 • • • • using fluid fuel **[2022.01]**
9/1845 • • • • using solid fuel **[2022.01]**
9/1854 • • for air heaters **[2022.01]**
9/1863 • • • Arrangement or mounting of electric heating means **[2022.01]**
9/1877 • • • Arrangement or mounting of combustion heating means, e.g. grates or burners **[2022.01]**
9/1881 • • • • using fluid fuel **[2022.01]**
9/189 • • • • using solid fuel **[2022.01]**
9/20 • Arrangement or mounting of control or safety devices **[1, 2006.01, 2022.01]**
9/25 • • of remote control devices or control-panels **[2022.01]**
9/28 • • • characterised by the graphical user interface [GUI] **[2022.01]**
9/40 • Arrangements for preventing corrosion **[2022.01]**
9/45 • • for preventing galvanic corrosion, e.g. cathodic or electrolytic means **[2022.01]**

15/00 Control of fluid heaters [2022.01]
15/10 • characterised by the purpose of the control **[2022.01]**
15/104 • • Inspection; Diagnosis; Trial operation **[2022.01]**
15/108 • • Resuming operation, e.g. after power outages **[2022.01]**
15/112 • • Preventing or detecting blocked flues **[2022.01]**
15/116 • • • Disabling the heating means in response thereto **[2022.01]**
15/12 • • Preventing or detecting fluid leakage **[2022.01]**
15/124 • • Preventing or detecting electric faults, e.g. electric leakage **[2022.01]**
15/128 • • Preventing overheating **[2022.01]**
15/132 • • • Preventing the operation of water heaters with low water levels, e.g. dry-firing **[2022.01]**
15/136 • • Defrosting or de-icing; Preventing freezing **[2022.01]**
15/14 • • Cleaning; Sterilising; Preventing contamination by bacteria or microorganisms, e.g. by replacing fluid in tanks or conduits **[2022.01]**
15/144 • • Measuring or calculating energy consumption **[2022.01]**
15/148 • • • Assessing the current energy consumption **[2022.01]**
15/152 • • • Forecasting future energy consumption **[2022.01]**
15/156 • • Reducing the quantity of energy consumed; Increasing efficiency **[2022.01]**
15/16 • • Reducing cost using the price of energy, e.g. choosing or switching between different energy sources **[2022.01]**
15/164 • • • where the price of the electric supply changes with time **[2022.01]**
15/168 • • Reducing the electric power demand peak **[2022.01]**
15/172 • • Scheduling based on user demand, e.g. determining starting point of heating **[2022.01]**
15/174 • • Supplying heated water with desired temperature or desired range of temperature **[2022.01]**
15/175 • • • where the difference between the measured temperature and a set temperature is kept under a predetermined value **[2022.01]**
15/176 • • Improving or maintaining comfort of users **[2022.01]**
15/18 • • • Preventing sudden or unintentional change of fluid temperature **[2022.01]**
15/184 • • Preventing harm to users from exposure to heated water, e.g. scalding **[2022.01]**

15/196 • • Automatically filling bathtubs or pools; Reheating the water in bathtubs or pools **[2022.01]**
15/20 • characterised by control inputs **[2022.01]**
15/204 • • Temperature of the air before heating **[2022.01]**
15/208 • • Temperature of the air after heating **[2022.01]**
15/212 • • Temperature of the water **[2022.01]**
15/215 • • • before heating **[2022.01]**
15/219 • • • after heating **[2022.01]**
15/223 • • • in the water storage tank **[2022.01]**
15/225 • • • • at different heights of the tank **[2022.01]**
15/227 • • Temperature of the refrigerant in heat pump cycles **[2022.01]**
15/231 • • • at the evaporator **[2022.01]**
15/232 • • • at the condenser **[2022.01]**
15/235 • • Temperature of exhaust gases **[2022.01]**
15/238 • • Flow rate **[2022.01]**
15/242 • • Pressure **[2022.01]**
15/246 • • Water level **[2022.01]**
15/248 • • • of water storage tanks **[2022.01]**
15/25 • • Temperature of the heat-generating means in the heater **[2022.01]**
15/254 • • Room temperature **[2022.01]**
15/258 • • Outdoor temperature **[2022.01]**
15/262 • • Weather information or forecast **[2022.01]**
15/265 • • Occupancy **[2022.01]**
15/269 • • Time, e.g. hour or date **[2022.01]**
15/273 • • Address or location **[2022.01]**
15/277 • • Price **[2022.01]**
15/281 • • Input from user **[2022.01]**
15/288 • • Accumulation of deposits, e.g. lime or scale **[2022.01]**
15/292 • • Metering of electricity sold to the grid **[2022.01]**
15/296 • • Information from neighbouring devices **[2022.01]**
15/30 • characterised by control outputs; characterised by the components to be controlled **[2022.01]**
15/305 • • Control of valves (of heat pumps F24H 15/385, F24H 15/39) **[2022.01]**
15/31 • • • of valves having only one inlet port and one outlet port, e.g. flow rate regulating valves **[2022.01]**
15/315 • • • of mixing valves **[2022.01]**
15/32 • • • of switching valves (for by-passing F24H 15/325) **[2022.01]**
15/325 • • • of by-pass valves **[2022.01]**
15/33 • • Control of dampers **[2022.01]**
15/335 • • Control of pumps, e.g. on-off control (control of compressors of heat pumps F24H 15/38) **[2022.01]**
15/34 • • • Control of the speed of pumps **[2022.01]**
15/345 • • Control of fans, e.g. on-off control (control of fans of heat pump units F24H 15/375) **[2022.01]**
15/35 • • • Control of the speed of fans **[2022.01]**
15/355 • • Control of heat-generating means in heaters **[2022.01]**
15/36 • • • of burners **[2022.01]**
15/365 • • • • of two or more burners, e.g. an array of burners **[2022.01]**
15/37 • • • of electric heaters **[2022.01]**
15/375 • • Control of heat pumps **[2022.01]**
15/38 • • • Control of compressors of heat pumps **[2022.01]**
15/385 • • • Control of expansion valves of heat pumps **[2022.01]**
15/39 • • • Control of valves for distributing refrigerant to different evaporators or condensers in heat pumps **[2022.01]**
15/395 • • Information to users, e.g. alarms **[2022.01]**
15/40 • characterised by the type of controllers **[2022.01]**
15/407 • • using electrical switching, e.g. TRIAC **[2022.01]**
15/414 • • using electronic processing, e.g. computer-based **[2022.01]**
15/421 • • • using pre-stored data **[2022.01]**
15/429 • • • • for selecting operation modes **[2022.01]**
15/436 • • • • for selecting sleeping modes **[2022.01]**
15/443 • • • using a central controller connected to several sub-controllers **[2022.01]**
15/45 • • • remotely accessible **[2022.01]**
15/457 • • • • using telephone networks or Internet communication **[2022.01]**
15/464 • • • • using local wireless communication **[2022.01]**
15/479 • • • • for programming the system **[2022.01]**
15/486 • • using timers **[2022.01]**
15/493 • • specially adapted for enabling recognition of parts newly installed in the fluid heating system, e.g. for retrofitting or for repairing by replacing parts **[2022.01]**

F24S SOLAR HEAT COLLECTORS; SOLAR HEAT SYSTEMS (for producing mechanical power from solar energy F03G 6/00) **[2018.01]**

Note(s) [2018.01]

In this subclass, the following terms or expressions are used with the meanings indicated:
- "solar heat collector modules", often referred to simply as "modules", covers:
  a. whole solar heat collectors;
  b. elements of solar heat collectors, e.g. reflectors, lenses or heat storage elements;
- "absorbing elements" covers elements for absorbing solar rays and converting it into heat;
- "solar heat systems" covers systems having solar heat collectors as their components and using the collected heat.

10/00 Solar heat collectors using working fluids [2018.01]
10/10 • the working fluids forming pools or ponds **[2018.01]**
10/13 • • Salt-gradient ponds **[2018.01]**
10/17 • • using covers or floating solar absorbing elements **[2018.01]**
10/20 • having circuits for two or more working fluids (with means for exchanging heat between two or more fluids F24S 10/30) **[2018.01]**
10/25 • having two or more passages for the same working fluid layered in the direction of solar rays, e.g. having upper circulation channels connected with lower circulation channels **[2018.01]**

10/30 • with means for exchanging heat between two or more working fluids **[2018.01]**

10/40 • in absorbing elements surrounded by transparent enclosures, e.g. evacuated solar heat collectors **[2018.01]**

10/50 • the working fluids being conveyed between plates **[2018.01]**

10/55 • • with enlarged surfaces, e.g. with protrusions or corrugations (collectors comprising porous materials or permeable masses directly contacting the working fluids F24S 10/80) **[2018.01]**

10/60 • the working fluids trickling freely over absorbing elements **[2018.01]**

10/70 • the working fluids being conveyed through tubular absorbing conduits **[2018.01]**

10/75 • • with enlarged surfaces, e.g. with protrusions or corrugations (collectors comprising porous material or permeable masses directly contacting the working fluids F24S 10/80) **[2018.01]**

10/80 • comprising porous material or permeable masses directly contacting the working fluids (for conveying liquefied working fluid from evaporator sections to condenser sections with capillary force F24S 10/95) **[2018.01]**

10/90 • using internal thermosiphonic circulation **[2018.01]**

10/95 • • having evaporator sections and condenser sections, e.g. heat pipes **[2018.01]**

20/00 Solar heat collectors specially adapted for particular uses or environments [2018.01]

20/20 • Solar heat collectors for receiving concentrated solar energy, e.g. receivers for solar power plants **[2018.01]**

20/25 • • using direct solar radiation in combination with concentrated radiation **[2018.01]**

20/30 • Solar heat collectors for heating objects, e.g. solar cookers or solar furnaces **[2018.01]**

20/40 • Solar heat collectors combined with other heat sources, e.g. using electrical heating or heat from ambient air **[2018.01]**

20/50 • Rollable or foldable solar heat collector modules **[2018.01]**

20/55 • • made of flexible materials **[2018.01]**

20/60 • Solar heat collectors integrated in fixed constructions, e.g. in buildings **[2018.01]**

20/61 • • Passive solar heat collectors, e.g. operated without external energy sources **[2018.01]**

20/62 • • in the form of fences, balustrades or handrails **[2018.01]**

20/63 • • in the form of windows **[2018.01]**

20/64 • • in the form of floor constructions, grounds or roads **[2018.01]**

20/66 • • in the form of facade constructions, e.g. wall constructions (in the form of shingles or tiles F24S 20/69) **[2018.01]**

20/67 • • in the form of roof constructions (in the form of shingles or tiles F24S 20/69) **[2018.01]**

20/69 • • in the form of shingles or tiles **[2018.01]**

20/70 • Waterborne solar heat collector modules (for working fluids forming pools or ponds F24S 10/10) **[2018.01]**

20/80 • Airborne solar heat collector modules, e.g. inflatable structures **[2018.01]**

21/00 Solar heat collectors not provided for in groups F24S 10/00-F24S 20/00 [2018.01]

23/00 Arrangements for concentrating solar rays for solar heat collectors [2018.01]

23/30 • with lenses **[2018.01]**

23/70 • with reflectors **[2018.01]**

23/71 • • with parabolic reflective surfaces (with cylindro-parabolic reflective surfaces F24S 23/74) **[2018.01]**

23/72 • • with hemispherical reflective surfaces **[2018.01]**

23/74 • • with trough-shaped or cylindro-parabolic reflective surfaces **[2018.01]**

23/75 • • with conical reflective surfaces **[2018.01]**

23/77 • • with flat reflective plates **[2018.01]**

23/79 • • with spaced and opposed interacting reflective surfaces **[2018.01]**

25/00 Arrangement of stationary mountings or supports for solar heat collector modules [2018.01]

Note(s) [2018.01]

Arrangements also intended for use with photovoltaic modules should further be classified in the relevant groups of subclass H02S.

25/10 • extending in directions away from a supporting surface **[2018.01]**

25/11 • • using shaped bodies, e.g. concrete elements, foamed elements or moulded box-like elements **[2018.01]**

25/12 • • using posts in combination with upper profiles **[2018.01]**

25/13 • • Profile arrangements, e.g. trusses (F24S 25/12 takes precedence) **[2018.01]**

25/15 • • using bent plates; using assemblies of plates **[2018.01]**

25/16 • • Arrangement of interconnected standing structures; Standing structures having separate supporting portions for adjacent modules **[2018.01]**

25/20 • Peripheral frames for modules **[2018.01]**

25/30 • using elongate rigid mounting elements extending substantially along the mounting surface, e.g. for covering buildings with solar heat collectors (extending in directions away from the supporting surface F24S 25/10; peripheral frames for modules F24S 25/20) **[2018.01]**

25/33 • • forming substantially planar assemblies, e.g. of coplanar or stacked profiles **[2018.01]**

25/35 • • • by means of profiles with a cross-section defining separate supporting portions for adjacent modules **[2018.01]**

25/37 • • • forming coplanar grids comprising longitudinal and transversal profiles **[2018.01]**

25/40 • using plate-like mounting elements, e.g. profiled or corrugated plates; Plate-like module frames (extending in directions away from a supporting surface F24S 25/10) **[2018.01]**

25/50 • comprising elongate non-rigid elements, e.g. straps, wires or ropes **[2018.01]**

25/60 • Fixation means, e.g. fasteners, specially adapted for supporting solar heat collector modules **[2018.01]**

25/61 • • for fixing to the ground or to building structures **[2018.01]**

25/613 • • • in the form of bent strips or assemblies of strips; Hook-like connectors; Connectors to be mounted between building-covering elements **[2018.01]**

25/615 • • • for fixing to protruding parts of buildings, e.g. to corrugations or to standing seams **[2018.01]**

25/617 • • • Elements driven into the ground, e.g. anchor-piles; Foundations for supporting elements; Connectors for connecting supporting structures to the ground or to flat horizontal surfaces **[2018.01]**

25/63 • • for fixing modules or their peripheral frames to supporting elements **[2018.01]**

25/632 • • • Side connectors; Base connectors **[2018.01]**

25/634 • • • Clamps; Clips **[2018.01]**

25/636 • • • • clamping by screw-threaded elements **[2018.01]**

25/65 • • for coupling adjacent supporting elements, e.g. for connecting profiles together **[2018.01]**

25/67 • • for coupling adjacent modules or their peripheral frames (for fixing modules or their peripheral frames to supporting elements F24S 25/63) **[2018.01]**

25/70 • with means for adjusting the final position or orientation of supporting elements in relation to each other or to a mounting surface; with means for compensating mounting tolerances **[2018.01]**

30/00 Arrangements for moving or orienting solar heat collector modules [2018.01]

Note(s) [2018.01]

Arrangements also intended for use with photovoltaic modules should further be classified in the relevant groups of subclass H02S.

30/20 • for linear movement **[2018.01]**

30/40 • for rotary movement **[2018.01]**

30/42 • • with only one rotation axis **[2018.01]**

30/422 • • • Vertical axis **[2018.01]**

30/425 • • • Horizontal axis **[2018.01]**

30/428 • • • with inclined axis **[2018.01]**

30/45 • • with two rotation axes **[2018.01]**

30/452 • • • with vertical primary axis **[2018.01]**

30/455 • • • with horizontal primary axis **[2018.01]**

30/458 • • • with inclined primary axis **[2018.01]**

30/48 • • with three or more rotation axes or with multiple degrees of freedom **[2018.01]**

40/00 Safety or protection arrangements of solar heat collectors; Preventing malfunction of solar heat collectors (control arrangements F24S 50/00) **[2018.01]**

40/10 • Protective covers or shrouds; Closure members, e.g. lids (transparent coverings F24S 80/50) **[2018.01]**

40/20 • Cleaning; Removing snow **[2018.01]**

40/40 • Preventing corrosion; Protecting against dirt or contamination **[2018.01]**

40/42 • • Preventing condensation inside solar modules (by venting F24S 40/53) **[2018.01]**

40/44 • • Draining rainwater or condensation **[2018.01]**

40/46 • • Maintaining vacuum, e.g. by using getters **[2018.01]**

40/48 • • Deaerating or degassing the working fluid **[2018.01]**

40/50 • Preventing overheating or overpressure (by draining the working fluid F24S 40/60) **[2018.01]**

40/52 • • by modifying the heat collection, e.g. by defocusing or by changing the position of heat-receiving elements **[2018.01]**

40/53 • • by venting solar heat collector enclosures **[2018.01]**

40/55 • • Arrangements for cooling, e.g. by using external heat dissipating means or internal cooling circuits (by venting F24S 40/53) **[2018.01]**

40/57 • • Preventing overpressure in solar heat collector enclosures (by venting F24S 40/53) **[2018.01]**

40/58 • • Preventing overpressure in working fluid circuits **[2018.01]**

40/60 • Arrangements for draining the working fluid **[2018.01]**

40/70 • Preventing freezing (arrangements for draining the working fluid F24S 40/60) **[2018.01]**

40/80 • Accommodating differential expansion of solar heat collector elements **[2018.01]**

40/90 • Arrangements for testing solar heat collectors **[2018.01]**

50/00 Arrangements for controlling solar heat collectors [2018.01]

50/20 • for tracking **[2018.01]**

50/40 • responsive to temperature **[2018.01]**

50/60 • responsive to wind **[2018.01]**

50/80 • for controlling collection or absorption of solar radiation **[2018.01]**

60/00 Arrangements for storing heat collected by solar heat collectors (in working fluids forming pools or ponds F24S 10/10) **[2018.01]**

60/10 • using latent heat **[2018.01]**

60/20 • using chemical reactions, e.g. thermochemical reactions or isomerisation reactions **[2018.01]**

60/30 • storing heat in liquids **[2018.01]**

70/00 Details of absorbing elements [2018.01]

70/10 • characterised by the absorbing material (absorbing coatings or surface treatment for increasing absorption F24S 70/20) **[2018.01]**

70/12 • • made of metallic material **[2018.01]**

70/14 • • made of plastics **[2018.01]**

70/16 • • made of ceramic; made of concrete; made of natural stone **[2018.01]**

70/20 • characterised by absorbing coatings; characterised by surface treatment for increasing absorption **[2018.01]**

70/225 • • for spectrally selective absorption **[2018.01]**

70/25 • • Coatings made of metallic material **[2018.01]**

70/275 • • Coatings made of plastics **[2018.01]**

70/30 • Auxiliary coatings, e.g. anti-reflective coatings **[2018.01]**

70/60 • characterised by the structure or construction (absorbing coatings or surface treatment for increasing absorption F24S 70/20; auxiliary coatings F24S 70/30) **[2018.01]**

70/65 • • Combinations of two or more absorbing elements **[2018.01]**

80/00 Details, accessories or component parts of solar heat collectors not provided for in groups F24S 10/00-F24S 70/00 [2018.01]

80/10 • Materials for heat-exchange conduits **[2018.01]**

80/20 • Working fluids specially adapted for solar heat collectors **[2018.01]**

80/30 • Arrangements for connecting the fluid circuits of solar heat collectors with each other or with other components, e.g. pipe connections; Fluid distributing means, e.g. headers **[2018.01]**

80/40 • Casings **[2018.01]**

80/45 • • characterised by the material **[2018.01]**

80/453 • • • made of metallic material **[2018.01]**

80/457 • • • made of plastics **[2018.01]**

80/50 • Transparent coverings; Elements for transmitting incoming solar rays and preventing outgoing heat radiation **[2018.01]**

80/52 • • characterised by the material (for preventing heat loss F24S 80/56) **[2018.01]**

80/525 • • • made of plastics **[2018.01]**

80/54 • • using evacuated elements **[2018.01]**

80/56 • • characterised by means for preventing heat loss **[2018.01]**

80/58 • • characterised by their mountings or fixing means **[2018.01]**

80/60 • Thermal insulation (transparent coverings F24S 80/50) **[2018.01]**

80/65 • • characterised by the material **[2018.01]**

80/70 • Sealing means **[2018.01]**

90/00 Solar heat systems not otherwise provided for [2018.01]

90/10 • using thermosiphonic circulation **[2018.01]**

F24T GEOTHERMAL COLLECTORS; GEOTHERMAL SYSTEMS [2018.01]

10/00 Geothermal collectors [2018.01]

10/10 • with circulation of working fluids through underground channels, the working fluids not coming into direct contact with the ground **[2018.01]**

10/13 • • using tube assemblies suitable for insertion into boreholes in the ground, e.g. geothermal probes **[2018.01]**

10/15 • • • using bent tubes; using tubes assembled with connectors or with return headers **[2018.01]**

10/17 • • • using tubes closed at one end, i.e. return-type tubes **[2018.01]**

10/20 • using underground water as working fluid; using working fluid injected directly into the ground, e.g. using injection wells and recovery wells **[2018.01]**

10/30 • using underground reservoirs for accumulating working fluids or intermediate fluids **[2018.01]**

10/40 • operated without external energy sources, e.g. using thermosiphonic circulation or heat pipes **[2018.01]**

50/00 Geothermal systems (for producing mechanical power from geothermal energy F03G 4/00) **[2018.01]**

F24V COLLECTION, PRODUCTION OR USE OF HEAT NOT OTHERWISE PROVIDED FOR [2018.01]

30/00 Apparatus or devices using heat produced by exothermal chemical reactions other than by combustion [2018.01]

40/00 Production or use of heat resulting from internal friction of moving fluids or from friction between fluids and moving bodies [2018.01]

40/10 • the fluid passing through restriction means **[2018.01]**

50/00 Use of heat from natural sources, e.g. from the sea [2018.01]

99/00 Subject matter not provided for in other main groups of this subclass [2018.01]