

CPC**COOPERATIVE PATENT CLASSIFICATION****F24D**

DOMESTIC- OR SPACE-HEATING SYSTEMS, e.g. CENTRAL HEATING SYSTEMS; DOMESTIC HOT-WATER SUPPLY SYSTEMS; ELEMENTS OR COMPONENTS THEREFOR (preventing corrosion [C23F](#); water supply in general [E03](#); using steam or condensate extracted or exhausted from steam engine plants for heating purposes [F01K 17/02](#); steam traps [F16T](#); domestic stoves or ranges [F24B](#), C; water or air heaters having heat generating means [F24H](#); combined heating and refrigeration systems [F25B](#); heat exchange apparatus or elements [F28](#); removing furring [F28G](#))

NOTE

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.

Central Heating Systems

- F24D 1/00** **Steam central heating systems** ([F24D 10/00](#), [F24D 11/00](#) take precedence)
- [F24D 1/005](#) . {in combination with systems for domestic water supply}
- [F24D 1/02](#) . operating with live steam {([F24D 1/005](#) takes precedence)}
- [F24D 1/04](#) . operating with exhaust steam {([F24D 1/005](#) takes precedence)}
- [F24D 1/06](#) . operating with superheated steam {([F24D 1/005](#) takes precedence)}
- [F24D 1/08](#) . Feed-line arrangements, e.g. providing for heat-accumulator tanks, expansion tanks
- F24D 3/00** **Hot-water central heating systems** ([F24D 10/00](#), [F24D 11/00](#) take precedence)
- [F24D 3/005](#) . {combined with solar energy (solar heat collectors per se [F24J 2/00](#))}
- [F24D 3/02](#) . with forced circulation, e.g. by pumps (pump constructions [F04](#))
- [F24D 3/04](#) . with the water under high pressure
- [F24D 3/06](#) .. Arrangements or devices for maintaining high pressure
- [F24D 3/08](#) . in combination with systems for domestic hot-water supply
- [F24D 3/082](#) .. {Hot water storage tanks specially adapted therefor}
- [F24D 3/085](#) ... {Double-walled tanks}
- [F24D 3/087](#) .. {Tap water heat exchangers specially adapted therefore}

- F24D 3/10 . Feed-line arrangements, e.g. providing for heat-accumulator tanks, expansion tanks { Hydraulic components of a central heating system}
- F24D 3/1008 .. {expansion tanks}
- F24D 3/1016 ... { Tanks having a bladder}
- F24D 3/1025 ... { Compressor controlled pressure heads}
- F24D 3/1033 ... { with compressed gas cylinder}
- F24D 3/1041 ... { Flow-through}
- F24D 3/105 .. {pumps combined with multiple way valves}
- F24D 3/1058 .. {disposition of pipes and pipe connections}
- F24D 3/1066 ... {Distributors for heating liquids}
- F24D 3/1075 { Built up from modules}
- F24D 3/1083 .. { Filling valves or arrangements for filling}
- F24D 3/1091 .. { Mixing cylinders}

- F24D 3/12 . Tube and panel arrangements for ceiling, wall, or underfloor heating (electric underfloor heating [F24D 13/02](#); special adaptations of floors for incorporating ducts, e.g. for heating or ventilating, [E04B 5/48](#); building elements of block or other shape for the construction of parts of buildings characterised by special adaptations, e.g. serving for locating conduits, [E04C 1/39](#); building elements of relatively thin form for the construction of parts of buildings with special adaptations for auxiliary purposes, e.g. serving for locating conduits, [E04C 2/52](#))
- F24D 3/122 .. { Details}
- F24D 3/125 ... { Hydraulic pipe connections}
- F24D 3/127 ... { Mechanical connections between panels}
- F24D 3/14 .. incorporated in a ceiling, wall or floor
- F24D 3/141 ... {Tube mountings specially adapted therefor}
- F24D 3/142 {integrated in prefab construction elements}
- F24D 3/143 { Tube clips with barbed anchors}
- F24D 3/144 { Clips for fastening heating tubes on a reinforcement net or mesh, e.g. mesh for concrete reinforcement}
- F24D 3/145 ... {Convecting elements concealed in wall or floor}
- F24D 3/146 ... {Tubes specially adapted for underfloor heating}
- F24D 3/147 ... {arranged in facades}
- F24D 3/148 ... { with heat spreading plates}
- F24D 3/149 ... { Tube-laying devices}
- F24D 3/16 .. mounted on, or adjacent to, a ceiling, wall or floor
- F24D 3/165 ... {Suspended radiant heating ceiling}

- F24D 3/18 . using heat pumps

- F24D 5/00** **Hot-air central heating systems** ([F24D 10/00](#), [F24D 11/00](#) take precedence; air conditioning [F24F](#)); **Exhaust gas central heating systems**

- F24D 5/005 . {combined with solar energy (solar heat collectors per se [F24J 2/00](#))}

- F24D 5/02 . operating with discharge of hot air into the space or area to be heated
- F24D 5/04 .. with return of the air or the air-heater

- F24D 5/06 . operating without discharge of hot air into the space or area to be heated
- F24D 5/08 .. with hot air led through radiators
- F24D 5/10 .. with hot air led through heat-exchange ducts in the walls, floor or ceiling

- F24D 5/12 . using heat pumps

- F24D 7/00** **Central heating systems employing heat-transfer fluids not covered by groups [F24D 1/00](#) to [F24D 5/00](#), e.g. oil, salt, gas ([F24D 10/00](#), [F24D 11/00](#) take precedence)**

- F24D 9/00** **Central heating systems employing combinations of heat transfer fluids covered by two or more of groups [F24D 1/00](#) to [F24D 7/00](#)([F24D 10/00](#), [F24D 11/00](#) take precedence)**

- F24D 9/02 . Hot water and steam systems

- F24D 10/00** **District heating systems**

- F24D 10/003 . {Domestic delivery stations having a heat exchanger}
- F24D 10/006 . {Direct domestic delivery stations}

- F24D 11/00** **Central heating systems using heat accumulated in storage masses (self-contained storage heating units [F24D 15/02](#); storage masses, see the relevant subclasses)**

- F24D 11/001 . {district heating system}
- F24D 11/002 . {water heating system}
- F24D 11/003 .. {combined with solar energy}
- F24D 11/004 .. {with conventional supplementary heat source}
- F24D 11/005 .. {with recuperation of waste heat}

- F24D 11/006 . {air heating system}
- F24D 11/007 .. {combined with solar energy}
- F24D 11/008 .. {with conventional supplementary heat source}
- F24D 11/009 .. {with recuperation of waste heat}

- F24D 11/02 . using heat pumps {using heat-pumps (for producing heat in general [F25B 29/00](#))}
- F24D 11/0207 .. {district heating system}
- F24D 11/0214 .. {water heating system}
- F24D 11/0221 ... {combined with solar energy}
- F24D 11/0228 ... {combined with conventional heater}
- F24D 11/0235 ... {with recuperation of waste energy}

- F24D 11/0242 {contained in exhausted air}
- F24D 11/025 {contained in waste water}
- F24D 11/0257 .. {air heating system}
- F24D 11/0264 . . . {combined with solar energy}
- F24D 11/0271 . . . {combined with conventional energy}
- F24D 11/0278 . . . {with recuperation of waste energy}
- F24D 11/0285 {contained in exhausted air}
- F24D 11/0292 {contained in waste water}

F24D 12/00 **Other central heating systems**

- F24D 12/02 . having more than one heat source ([F24D 3/18](#), [F24D 5/12](#), [F24D 11/02](#) take precedence)

Other domestic- or space-heating systems

F24D 13/00 **Electric heating systems** (electric water or air heaters [F24H](#))

- F24D 13/02 . solely using resistance heating, e.g. under-floor heating
- F24D 13/022 .. {resistances incorporated in construction elements}
- F24D 13/024 . . . {in walls, floors, ceilings}
- F24D 13/026 . . . {in door, windows}
- F24D 13/028 . . . { Glass panels, e.g. mirrors, design radiators, etc.}
- F24D 13/04 . using electric heating of heat-transfer fluid in separate units of the system

F24D 15/00 **Other domestic- or space-heating systems**

- F24D 15/02 . consisting of self-contained heating units, e.g. storage heaters
- F24D 15/04 . using heat pumps

F24D 17/00 **Domestic hot-water supply systems** (combined with domestic- or space-heating systems [F24D 1/00](#) to [F24D 15/00](#))

- F24D 17/0005 . {using recuperation of waste heat ([F24D 17/0036](#) takes precedence)}
- F24D 17/001 .. {with accumulation of heated water}
- F24D 17/0015 . {using solar energy ([F24D 17/0036](#) takes precedence)}
- F24D 17/0021 .. {with accumulation of the heated water}
- F24D 17/0026 . {with conventional heating means ([F24D 17/0036](#) takes precedence)}
- F24D 17/0031 .. {with accumulation of the heated water}
- F24D 17/0036 . {with combination of different kinds of heating means}

- F24D 17/0042 .. {recuperated waste heat and solar energy}
- F24D 17/0047 ... {with accumulation of the heated water}
- F24D 17/0052 .. {recuperated waste heat and conventional heating means}
- F24D 17/0057 ... {with accumulation of the heated water}
- F24D 17/0063 .. {solar energy and conventional heaters}
- F24D 17/0068 ... {with accumulation of the heated water}

- F24D 17/0073 . {Arrangements for preventing the occurrence or proliferation of micro-organisms in the water}

- F24D 17/0078 . {Recirculation systems}
- F24D 17/0084 .. { Coaxial tubings}

- F24D 17/0089 . { Additional heating means, e.g. electric heated buffer tanks or electric continuous flow heaters, located close to the consumer, e.g. directly before the water taps in bathrooms, in domestic hot water lines}

- F24D 17/0094 . { Recovering of cold water}

- F24D 17/02 . using heat pumps

- F24D 19/00** **Details** (of water or air heaters [F24H 9/00](#); of heat-exchange or heat-transfer apparatus, of general application [F28F](#))

- F24D 19/0002 . { Means for connecting central heating radiators to circulation pipes}
- F24D 19/0004 .. { In a one pipe system}
- F24D 19/0007 ... { Comprising regulation means}
- F24D 19/0009 .. { In a two pipe system}
- F24D 19/0012 ... { Comprising regulation means}
- F24D 19/0014 .. { Connection means adaptable for one and two pipe systems}
- F24D 19/0017 .. { Connections between supply and inlet or outlet of central heating radiators}
- F24D 19/0019 ... { Means for adapting connections}
- F24D 19/0021 ... { Flexible tubes or hoses}
- F24D 19/0024 ... { Connections for plate radiators}
- F24D 19/0026 .. { Places of the inlet on the radiator}
- F24D 19/0029 ... { on a top corner}
- F24D 19/0031 ... { on the top in the middle}
- F24D 19/0034 ... { on a bottom corner}
- F24D 19/0036 ... { on the bottom in the middle}
- F24D 19/0039 .. { Places of the outlet on the radiator}
- F24D 19/0041 ... { on the top in the middle}
- F24D 19/0043 ... { on the opposite top corner}
- F24D 19/0046 ... { on the top on the same side}
- F24D 19/0048 ... { on the bottom in the middle}
- F24D 19/0051 ... { on the bottom on the opposite corner}

- F24D 19/0053 . . . { on the bottom on the same side}
- F24D 19/0056 .. { Supplies from the central heating system}
- F24D 19/0058 . . . { coming out the floor}
- F24D 19/006 { Alongside the radiator}
- F24D 19/0063 { under the radiator}
- F24D 19/0065 . . . { coming out the wall}
- F24D 19/0068 { alongside the radiator}
- F24D 19/007 { under the radiator}
- F24D 19/0073 .. { Means for changing the flow of the fluid inside a radiator}
- F24D 19/0075 .. { Valves for isolating the radiator from the system}
- F24D 19/0078 .. { Plugs}

- F24D 19/008 . { Details related to central heating radiators}
- F24D 19/0082 .. { Humidifiers for radiators}
- F24D 19/0085 .. { Fresh air entries for air entering the room to be heated by the radiator}
- F24D 19/0087 .. { Fan arrangements for forced convection}
- F24D 19/009 .. { Magnets, e.g. for attaching a cover}

- F24D 19/0092 . {Devices for preventing or removing corrosion, slime or scale}

- F24D 19/0095 . {Devices for preventing damage by freezing}

- F24D 19/0097 . { Casings or frame structures for hydraulic components}

- F24D 19/02 . Arrangement of mountings or supports for radiators
- F24D 19/0203 .. { Types of supporting means}
- F24D 19/0206 . . . { Tube shaped supports inserted into a wall}
- F24D 19/0209 . . . { Supporting means having bracket}
- F24D 19/0213 . . . { Floor mounted supporting means}
- F24D 19/0216 . . . { Supporting means having a rail}
- F24D 19/022 .. { Constructional details of supporting means for radiators}
- F24D 19/0223 . . . { Distance pieces between the radiator and the wall}
- F24D 19/0226 . . . { Additional means supporting the process of mounting}
- F24D 19/023 . . . { Radiators having fixed suspension means for connecting the radiator to the support means}
- F24D 19/0233 . . . { Templates for installing the radiator}
- F24D 19/0236 . . . { Water tubes or pipes forming part of the supporting means}
- F24D 19/024 .. { Functioning details of supporting means for radiators}
- F24D 19/0243 . . . { Means for moving the radiator horizontally to adjust the radiator position}
- F24D 19/0246 . . . { Means for moving the radiator vertically to adjust the radiator position}
- F24D 19/025 . . . { Eccentric means for moving the radiator vertically}
- F24D 19/0253 . . . { Adjusting a dimension, e.g. length, of the radiator support, e.g. telescopic rails}
- F24D 19/0256 . . . { Radiators clamped by supporting means}
- F24D 19/0259 { Radiators clamped by supporting means around a column or tube}

- F24D 19/0263 { Radiators clamped by supporting means between two columns or tubes}
- F24D 19/0273 . . . { Radiators fixed in order to prevent undesired detachment}
- F24D 19/0276 { Radiators fixed on the bottom}
- F24D 19/0279 { Radiators fixed on the sides}
- F24D 19/0283 { Radiators fixed on the top}
- F24D 19/0286 { Radiators fixed using a spring}
- F24D 19/0289 { Radiators fixed using a flexible clip}
- F24D 19/0293 . . . { Radiators rotating without being demounted}
- F24D 19/04 . . in skirtings

- F24D 19/06 . Casings, cover lids or ornamental panels, for radiators
- F24D 19/061 . . {Radiator shelves}
- F24D 19/062 . . {Heat reflecting or insulating shields}
- F24D 19/064 . . { Coverings not directly attached to a radiator, e.g. box-like coverings}
- F24D 19/065 . . { Grids attached to the radiator and covering its top}
- F24D 19/067 . . { Front coverings attached to the radiator}
- F24D 19/068 . . { Side coverings attached to the radiator}

- F24D 19/08 . Arrangements for drainage, venting or aerating ([valves for drainage F16K](#), e.g. [F16K 21/00](#); for venting or aerating [F16K 24/00](#))
- F24D 19/081 . . {for steam heating systems}
- F24D 19/082 . . {for water heating systems}
- F24D 19/083 . . . {Venting arrangements}
- F24D 19/085 {Arrangement of venting valves for central heating radiators}
- F24D 19/086 {hand-operated}
- F24D 19/087 {automatic}
- F24D 19/088 . . . {Draining arrangements}

- F24D 19/10 . Arrangement or mounting of control or safety devices ([control valves F16K](#) ; only the heater being controlled [F24H 9/20](#)){ including control or safety methods}
- F24D 19/1003 . . {for steam heating systems}
- F24D 19/1006 . . {for water heating systems}
- F24D 19/1009 . . . {for central heating}
- F24D 19/1012 {by regulating the speed of a pump}
- F24D 19/1015 {using a valve or valves}
- F24D 19/1018 { Radiator valves}
- F24D 19/1021 {a by pass valve}
- F24D 19/1024 {a multiple way valve}
- F24D 19/1027 {hand operated}
- F24D 19/103 {bimetal operated}
- F24D 19/1033 {motor operated}
- F24D 19/1036 { Having differential pressure measurement facilities}
- F24D 19/1039 {the system uses a heat pump}

F24D 19/1042	....	{the system uses solar energy}
F24D 19/1045	....	{the system uses a heat pump and solar energy}
F24D 19/1048	....	{Counting of energy consumption}
F24D 19/1051	...	{for domestic hot water}
F24D 19/1054	....	{the system uses a heat pump}
F24D 19/1057	....	{the system uses solar energy}
F24D 19/106	....	{the system uses a heat pump and solar energy}
F24D 19/1063	....	{counting of energy consumption}
F24D 19/1066	...	{for the combination of central heating and domestic hot water}
F24D 19/1069	....	{regulation in function of the temperature of the domestic hot water}
F24D 19/1072	....	{the system uses a heat pump}
F24D 19/1075	....	{the system uses solar energy}
F24D 19/1078	....	{the system uses a heat pump and solar energy}
F24D 19/1081	....	{counting of energy consumption}
F24D 19/1084	..	{for air heating systems}
F24D 19/1087	...	{system using a heat pump}
F24D 19/109	...	{system using solar energy}
F24D 19/1093	...	{system using a heat pump and solar energy}
F24D 19/1096	..	{for electric heating systems}

F24D 2019/00 **Details** (of water or air heaters [F24H 9/00](#); of heat-exchange or heat-transfer apparatus, of general application [F28F](#))

F24D 2019/02	.	Arrangement of mountings or supports for radiators
F24D 2019/024	..	{ Functioning details of supporting means for radiators}
F24D 2019/0256	...	{ Radiators clamped by supporting means}
F24D 2019/0266	....	Radiators clamped by supporting means around a column or tube
F24D 2019/0269	....	Radiators clamped by supporting means between two columns or tubes
F24D 2019/0296	..	having spring loaded holding means

F24D 2200/00 **Heat sources or energy sources**

F24D 2200/02	.	Photovoltaic energy
F24D 2200/04	.	Gas or oil fired boiler
F24D 2200/043	..	More than one gas or oil fired boiler
F24D 2200/046	..	Condensing boilers
F24D 2200/06	.	Solid fuel fired boiler
F24D 2200/062	..	Coal fired boilers

- F24D 2200/065 . . Wood fired boilers
- F24D 2200/067 . . . Pellet fired boilers
- F24D 2200/07 . Solid fuel burners
- F24D 2200/08 . Electric heater
- F24D 2200/10 . Fire place
- F24D 2200/11 . Geothermal energy
- F24D 2200/115 . . Involving mains water supply
- F24D 2200/12 . Heat pump
- F24D 2200/123 . . Compression type heat pumps
- F24D 2200/126 . . Absorption type heat pumps
- F24D 2200/13 . Heat from a district heating network
- F24D 2200/14 . Solar energy
- F24D 2200/15 . Wind energy
- F24D 2200/16 . Waste heat
- F24D 2200/18 . . Flue gas recuperation
- F24D 2200/19 . . Fuel cells
- F24D 2200/20 . . Sewage water
- F24D 2200/22 . . Ventilation air
- F24D 2200/24 . . Refrigeration
- F24D 2200/26 . . Internal combustion engine
- F24D 2200/28 . . Biological processes
- F24D 2200/29 . . Electrical devices, e.g. computers, servers
- F24D 2200/30 . . Friction
- F24D 2200/31 . . Air conditioning systems
- F24D 2200/32 . involving multiple heat sources in combination or as alternative heat sources

Central Heating Systems

F24D 2220/00 Components of central heating installations excluding heat sources

- F24D 2220/003 . Generic central heating systems
- F24D 2220/006 . Parts of a building integrally forming part of heating systems, e.g. a wall as a heat storing mass
- F24D 2220/02 . Fluid distribution means
- F24D 2220/0207 . . Pumps

- F24D 2220/0214 .. Inlets or outlets
- F24D 2220/0221 .. Mixing cylinders
- F24D 2220/0228 .. Branched distribution conduits
- F24D 2220/0235 .. Three-way-valves
- F24D 2220/0242 .. Multiple way valves
- F24D 2220/025 .. Check valves
- F24D 2220/0257 .. Thermostatic valves
- F24D 2220/0264 .. Hydraulic balancing valves
- F24D 2220/0271 .. Valves
- F24D 2220/0278 .. Expansion vessels
- F24D 2220/0285 .. Pipe sections
- F24D 2220/0292 .. Fluid distribution networks

- F24D 2220/04 . Sensors
 - F24D 2220/042 .. Temperature sensors
 - F24D 2220/044 .. Flow sensors
 - F24D 2220/046 .. Pressure sensors
 - F24D 2220/048 .. Level sensors, e.g. water level sensors

- F24D 2220/06 . Heat exchangers

- F24D 2220/07 . Heat pipes

- F24D 2220/08 . Storage tanks

- F24D 2220/10 . Heat storage materials, e.g. phase change materials or static water enclosed in a space

- F24D 2220/20 . Heat consumers
 - F24D 2220/2009 .. Radiators
 - F24D 2220/2018 ... Column radiators having vertically extending tubes
 - F24D 2220/2027 ... Convectors (radiators wherein heat transfer mainly takes place by convection)
 - F24D 2220/2036 ... Electric radiators
 - F24D 2220/2045 ... Radiators having horizontally extending tubes
 - F24D 2220/2054 ... Panel radiators with or without extended convection surfaces
 - F24D 2220/2063 ... Central heating radiators having heat storage material incorporated
 - F24D 2220/2072 ... Radiators being skirting boards between floor and wall or ledges between wall and ceiling
 - F24D 2220/2081 .. Floor or wall heating panels
 - F24D 2220/209 .. Sanitary water taps

- F24D 2240/00 Characterizing positions e.g. of sensors, inlets, outlets**

- F24D 2240/10 . Placed within or inside of

- F24D 2240/12 . Placed outside of
- F24D 2240/20 . Placed at top position
- F24D 2240/22 . Placed at bottom position
- F24D 2240/24 . Placed at centre position
- F24D 2240/243 .. Vertically centred
- F24D 2240/246 .. Horizontally centred
- F24D 2240/26 . Vertically distributed at fixed positions, e.g. multiple sensors distributed over the height of a tank, or a vertical inlet distribution pipe having a plurality of orifices
- F24D 2240/28 . Horizontally distributed at fixed positions
- F24D 2240/30 . At vertical variable positions, e.g. a movable inlet pipe within a tank
- F24D 2240/32 . At horizontal variable positions