

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

LIGHTING; HEATING

F25 REFRIGERATION OR COOLING; COMBINED HEATING AND REFRIGERATION SYSTEMS; HEAT PUMP SYSTEMS; MANUFACTURE OR STORAGE OF ICE; LIQUEFACTION SOLIDIFICATION OF GASES

F25B REFRIGERATION MACHINES, PLANTS OR SYSTEMS; COMBINED HEATING AND REFRIGERATION SYSTEMS; HEAT PUMP SYSTEMS

Compression machines, plants or systems

- 1/00** Compression machines, plants or systems with non-reversible cycle ([F25B 3/00](#), [F25B 5/00](#), [F25B 6/00](#), [F25B 7/00](#), [F25B 9/00](#) take precedence)
- 1/005 . {of the single unit type ([F25B 1/10](#) takes precedence)}
- 1/02 . with compressor of reciprocating-piston type ([F25B 1/005](#), [F25B 1/10](#) take precedence)
- 1/04 . with compressor of rotary type ([F25B 1/005](#), [F25B 1/10](#) take precedence)
- 1/047 . . of screw type
- 1/053 . . of turbine type
- 1/06 . with compressor of jet type, e.g. using liquid under pressure ([F25B 1/005](#), [F25B 1/10](#) take precedence)
- 1/08 . . using vapour under pressure
- 1/10 . with multi-stage compression (with cascade operation [F25B 7/00](#))
- 3/00** Self-contained rotary compression machines, i.e. with compressor, condenser and evaporator rotating as a single unit
- 5/00** Compression machines, plants or systems, with several evaporator circuits, e.g. for varying refrigerating capacity (with cascade operation [F25B 7/00](#))
- 5/02 . arranged in parallel
- 5/04 . arranged in series
- 6/00** Compression machines, plants or systems, with several condenser circuits
- 6/02 . arranged in parallel
- 6/04 . arranged in series
- 7/00** Compression machines, plants or systems, with cascade operation, i.e. with two or more circuits, the heat from the condenser of one circuit being absorbed by the evaporator of the next circuit ([F25B 9/00](#) takes precedence)
- 9/00** Compression machines, plants or systems, in which the refrigerant is air or other gas of low boiling point
- 9/002 . {characterised by the refrigerant}
- 9/004 . . {the refrigerant being air}

- 9/006 . . {the refrigerant containing more than one component ([F25B 9/004](#) takes precedence)}
- 9/008 . . {the refrigerant being carbon dioxide}
- 9/02 . using Joule-Thompson effect; using vortex effect
- 9/04 . . using vortex effect
- 9/06 . using expanders ([F25B 9/10](#) takes precedence)
- 9/065 . . {using pressurised gas jets}
- 9/08 . using ejectors ([F25B 9/10](#) takes precedence)
- 9/10 . with several cooling stages
- 9/12 . using ³He-⁴He dilution
- 9/14 . characterised by the cycle used, e.g. Stirling cycle
- 9/145 . . {pulse-tube cycle}

11/00 Compression machines, plants or systems, using turbines, e.g. gas turbines

- 11/02 . as expanders ([F25B 9/06](#) takes precedence)
- 11/04 . . centrifugal type

13/00 Compression machines, plants or systems, with reversible cycle (defrosting cycles [F25B 47/02](#))

Sorption machines, plants or systems

- 15/00** Sorption machines, plants or systems, operating continuously, e.g. absorption type
- 15/002 . {using the endothermic solution of salt}
- 15/004 . {of rotary type}
- 15/006 . {with cascade operation}
- 15/008 . {with multi-stage operation ([F25B 15/006](#) takes precedence)}
- 15/02 . without inert gas ([F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#), [F25B 15/12](#), [F25B 15/14](#), [F25B 15/16](#) take precedence)
- 15/025 . . {Liquid transfer means}
- 15/04 . . the refrigerant being ammonia evaporated from aqueous solution ([F25B 15/025](#) takes precedence)}
- 15/06 . . the refrigerant being water vapour evaporated from a salt solution, e.g. lithium bromide ([F25B 15/025](#) takes precedence)}
- 15/08 . . the refrigerant being sulfuric acid ([F25B 15/025](#) takes precedence)}
- 15/09 . . the refrigerant being hydrogen desorbed from a hydride ([F25B 15/025](#) takes precedence)}

- 15/10 . with inert gas ([F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#), [F25B 15/12](#), [F25B 15/14](#), [F25B 15/16](#) take precedence)
- 15/12 . with resorber ([F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#), [F25B 15/14](#) take precedence)
- 15/14 . using osmosis ([F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#) take precedence)
- 15/16 . using desorption cycle ([F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#) take precedence)
- 17/00 Sorption machines, plants or systems, operating intermittently, e.g. absorption or adsorption type**
- 17/02 . the absorbent or adsorbent being a liquid, e.g. brine ([F25B 17/10](#) takes precedence)
- 17/04 . . with two or more boilers operating alternately
- 17/06 . . with the boiler and evaporator built-up as a unit in a tiltable or revolving arrangement
- 17/08 . the absorbent or adsorbent being a solid, e.g. salt ([F25B 17/12](#) takes precedence)
- 17/083 . . {with two or more boiler-sorbers operating alternately}
- 17/086 . . {with two or more boiler-sorber/evaporator units}
- 17/10 . using the endothermic solution of salt
- 17/12 . using desorption of hydrogen from a hydride

Machines, plants or systems, with a single mode of operation, not covered by groups [F25B 1/00](#) - [F25B 17/00](#)

- 19/00 Machines, plants or systems, using evaporation of a refrigerant but without recovery of the vapour**
- 19/005 . {the refrigerant being a liquefied gas}
- 19/02 . using fluid jet, e.g. of steam ([F25B 19/005](#) takes precedence)
- 19/04 . . using liquid jet, e.g. of water
- 21/00 Machines, plants or systems, using electric or magnetic effects**
- 21/02 . using Peltier effect; using Nernst-Ettinghausen effect
- 21/04 . . reversible
- 23/00 Machines, plants or systems, with a single mode of operation not covered by groups [F25B 1/00](#) - [F25B 21/00](#), e.g. using selective radiation effect**
- 23/003 . {using selective radiation effect}
- 23/006 . {boiling cooling systems}

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- 25/00 Machines, plants or systems, using a combination of modes of operation covered by two or more of the groups [F25B 1/00](#) - [F25B 23/00](#)**
 - 25/005 . {using primary and secondary systems}
 - 25/02 . Compression-sorption machines, plants, or systems
 - 27/00 Machines, plants or systems, using particular sources of energy ([F25B 30/06](#) takes precedence)**
 - 27/002 . {using solar energy}
 - 27/005 . . {in compression type systems}
 - 27/007 . . {in sorption type systems}
 - 27/02 . using waste heat, e.g. from internal-combustion engines
 - 29/00 Combined heating and refrigeration systems, e.g. operating alternately or simultaneously**
 - 29/003 . {of the compression type system}

- 29/006 . {of the sorption type system}
- 30/00 Heat pumps ([F25B 1/00](#)-[F25B 25/00](#), [F25B 29/00](#) take precedence)**
- 30/02 . of the compression type
- 30/04 . of the sorption type
- 30/06 . characterised by the source of low potential heat

Component parts or details

- 31/00 Compressor arrangements**
- 31/002 . {Lubrication}
- 31/004 . . {oil recirculating arrangements}
- 31/006 . {Cooling of compressor or motor}
- 31/008 . . {by injecting a liquid}
- 31/02 . of motor-compressor units
- 31/023 . . {with compressor of reciprocating-piston type}
- 31/026 . . {with compressor of rotary type}
- 33/00 Boilers; Analysers; Rectifiers (boiler-absorbers [F25B 35/00](#))**
- 35/00 Boiler-absorbers, i.e. boilers usable for absorption or adsorption**
- 35/02 . using a liquid as sorbent, e.g. brine
- 35/04 . using a solid as sorbent
- 37/00 Absorbers; Adsorbers (boiler-absorbers [F25B 35/00](#))**
- 39/00 Evaporators; Condensers**
- 39/02 . Evaporators
- 39/022 . . {with plate-like or laminated elements}
- 39/024 . . . {with elements constructed in the shape of a hollow panel}
- 39/026 . . {specially adapted for sorption type systems}
- 39/028 . . {having distributing means}
- 39/04 . Condensers
- 40/00 Subcoolers, desuperheaters or superheaters**
- 40/02 . Subcoolers
- 40/04 . Desuperheaters
- 40/06 . Superheaters
- 41/00 Fluid-circulation arrangements**
- 41/006 . {optical fluid control arrangements}
- 41/10 . using electro-osmosis
- 41/20 . Disposition of valves, e.g. of on-off valves or flow control valves ([expansion valves \[F25B 41/31\]\(#\)](#))
- 41/22 . . between evaporator and compressor
- 41/24 . . Arrangement of shut-off valves for disconnecting a part of the refrigerant cycle, e.g. an outdoor part
- 41/26 . . of fluid flow reversing valves
- 41/28 . . specially adapted for sorption cycles
- 41/30 . Expansion means; Dispositions thereof
- 41/31 . . Expansion valves
- 41/315 . . . actuated by floats
- 41/32 . . . having flow rate limiting means other than the valve member, e.g. having bypass orifices in the valve body
- 41/325 . . . having two or more valve members
- 41/33 . . . with the valve member being actuated by the fluid pressure, e.g. by the pressure of the refrigerant
- 41/335 via diaphragms

- 41/34 . . . with the valve member being actuated by electric means, e.g. by piezoelectric actuators
- 41/345 by solenoids
- 41/347 {with the valve member being opened and closed cyclically, e.g. with pulse width modulation}
- 41/35 by rotary motors, e.g. by stepping motors
- 41/355 by electric heating of bimetal elements, shape memory elements or heat expanding elements
- 41/36 . . . with the valve member being actuated by bimetal elements or shape-memory elements influenced by fluids, e.g. by the refrigerant
- 41/37 . . Capillary tubes
- 41/375 . . . characterised by a variable restriction, e.g. restrictors made of shape memory alloy
- 41/38 . . specially adapted for reversible cycles, e.g. bidirectional expansion restrictors
- 41/385 . . Dispositions with two or more expansion means arranged in parallel on a refrigerant line leading to the same evaporator
- 41/39 . . Dispositions with two or more expansion means arranged in series, i.e. multi-stage expansion, on a refrigerant line leading to the same evaporator
- 41/40 . Fluid line arrangements
- 41/42 . . Arrangements for diverging or converging flows, e.g. branch lines or junctions
- 41/45 . . . for flow control on the upstream side of the diverging point, e.g. with spiral structure for generating turbulence
- 41/48 . . . for flow path resistance control on the downstream side of the diverging point, e.g. by an orifice

43/00 Arrangements for separating or purifying gases or liquids (in analysers or rectifiers F25B 33/00); Arrangements for vaporising the residuum of liquid refrigerant, e.g. by heat (F25B 40/00 takes precedence)

- 43/003 . {Filters}
- 43/006 . {Accumulators}
- 43/02 . for separating lubricants from the refrigerant
- 43/04 . for withdrawing non-condensable gases
- 43/043 . . {for compression type systems}
- 43/046 . . {for sorption type systems}

45/00 Arrangements for charging or discharging refrigerant

47/00 Arrangements for preventing or removing deposits or corrosion, not provided for in another subclass

- 47/003 . {for preventing corrosion}
- 47/006 . {for preventing frost}
- 47/02 . Defrosting cycles
- 47/022 . . {hot gas defrosting}
- 47/025 . . . {by reversing the cycle}
- 47/027 . . {for defrosting sorption type systems}

49/00 Arrangement or mounting of control or safety devices

- 49/005 . {of safety devices (F25B 49/02 and F25B 49/04 take precedence)}
- 49/02 . for compression type machines, plants or systems
- 49/022 . . {Compressor control arrangements}
- 49/025 . . {Motor control arrangements}

- 49/027 . . {Condenser control arrangements}
- 49/04 . for sorption type machines, plants or systems
- 49/043 . . {Operating continuously}
- 49/046 . . {Operating intermittently}

Indexing scheme associated with groups F25B 1/00 - F25B 49/00, relating to arrangements, features or devices for refrigeration machines, plants or systems, combined heating and refrigeration systems or heat-pump systems as well as solved problems, control issues and sensing of parameters therefore

2300/00 Special arrangements or features for refrigeration machines, plants or systems, combined heating and refrigeration systems or heat-pump systems

2309/00 Gas cycle refrigeration machines

- 2309/001 . with a linear configuration or a linear motor
- 2309/002 . with parallel working cold producing expansion devices in one circuit
- 2309/003 . characterised by construction or composition of the regenerator
- 2309/004 . using a compressor of the rotary type
- 2309/005 . using an expander of the rotary type
- 2309/006 . using a distributing valve of the rotary type
- 2309/02 . using the Joule-Thompson effect
- 2309/021 . . with a cryosurgical probe tip having a specific construction
- 2309/022 . . characterised by the expansion element
- 2309/023 . . with two stage expansion
- 2309/06 . Compression machines, plants or systems characterised by the refrigerant being carbon dioxide
- 2309/061 . . with cycle highest pressure above the supercritical pressure
- 2309/14 . Compression machines, plants or systems characterised by the cycle used
- 2309/1401 . . Ericsson or Ericsson cycles
- 2309/1402 . . Pulse-tube cycles with acoustic driver
- 2309/1403 . . Pulse-tube cycles with heat input into acoustic driver
- 2309/1404 . . Pulse-tube cycles with loudspeaker driven acoustic driver
- 2309/1405 . . Pulse-tube cycles with travelling waves
- 2309/1406 . . Pulse-tube cycles with pulse tube in co-axial or concentric geometrical arrangements
- 2309/1407 . . Pulse-tube cycles with pulse tube having in-line geometrical arrangements
- 2309/1408 . . Pulse-tube cycles with pulse tube having U-turn or L-turn type geometrical arrangements
- 2309/1409 . . Pulse-tube cycles with pulse tube having special type of geometrical arrangements not being a coaxial, in-line or U-turn type
- 2309/1411 . . Pulse-tube cycles characterised by control details, e.g. tuning, phase shifting or general control
- 2309/1412 . . Pulse-tube cycles characterised by heat exchanger details
- 2309/1413 . . Pulse-tube cycles characterised by performance, geometry or theory
- 2309/1414 . . Pulse-tube cycles characterised by pulse tube details
- 2309/1415 . . Pulse-tube cycles characterised by regenerator details
- 2309/1416 . . Pulse-tube cycles characterised by regenerator stack details

- 2309/1417 . . Pulse-tube cycles without any valves in gas supply and return lines
- 2309/1418 . . Pulse-tube cycles with valves in gas supply and return lines
- 2309/14181 . . . the valves being of the rotary type
- 2309/1419 . . Pulse-tube cycles with pulse tube having a basic pulse tube refrigerator [PTR], i.e. comprising a tube with basic schematic
- 2309/1421 . . Pulse-tube cycles characterised by details not otherwise provided for
- 2309/1422 . . Pulse tubes with basic schematic including a counter flow heat exchanger instead of a regenerative heat exchanger
- 2309/1423 . . Pulse tubes with basic schematic including an inertance tube
- 2309/1424 . . Pulse tubes with basic schematic including an orifice and a reservoir
- 2309/14241 . . . Pulse tubes with basic schematic including an orifice reservoir multiple inlet pulse tube
- 2309/1425 . . Pulse tubes with basic schematic including several pulse tubes
- 2309/1426 . . Pulse tubes with basic schematic including at the pulse tube warm end a so called warm end expander
- 2309/1427 . . Control of a pulse tube
- 2309/1428 . . Control of a Stirling refrigeration machine
- 2313/00** **Compression machines, plants or systems with reversible cycle not otherwise provided for**
- 2313/001 . with two or more accumulators
- 2313/002 . geothermal
- 2313/003 . Indoor unit with water as a heat sink or heat source
- 2313/004 . Outdoor unit with water as a heat sink or heat source
- 2313/005 . Outdoor unit expansion valves
- 2313/006 . two pipes connecting the outdoor side to the indoor side with multiple indoor units
- 2313/007 . three pipes connecting the outdoor side to the indoor side with multiple indoor units
- 2313/008 . Refrigerant heaters
- 2313/009 . indoor unit in circulation with outdoor unit in first operation mode, indoor unit in circulation with an other heat exchanger in second operation mode or outdoor unit in circulation with an other heat exchanger in third operation mode
- 2313/021 . Indoor unit or outdoor unit with auxiliary heat exchanger not forming part of the indoor or outdoor unit
- 2313/0211 . . the auxiliary heat exchanger being only used during defrosting
- 2313/0212 . . the auxiliary heat exchanger being only used during dehumidifying
- 2313/0213 . . the auxiliary heat exchanger being only used during heating
- 2313/0214 . . the auxiliary heat exchanger being used parallel to the indoor unit during heating operation
- 2313/0215 . . the auxiliary heat exchanger being used parallel to the outdoor heat exchanger during heating operation
- 2313/023 . using multiple indoor units
- 2313/0231 . . with simultaneous cooling and heating
- 2313/0232 . . with bypasses
- 2313/02321 . . . during cooling
- 2313/02322 . . . during defrosting
- 2313/02323 . . . during heating
- 2313/0233 . . in parallel arrangements
- 2313/02331 . . . during cooling
- 2313/02332 . . . during defrosting
- 2313/02333 . . . during dehumidification
- 2313/02334 . . . during heating
- 2313/0234 . . in series arrangements
- 2313/02341 . . . during cooling
- 2313/02342 . . . during defrosting
- 2313/02343 . . . during dehumidification
- 2313/02344 . . . during heating
- 2313/025 . using multiple outdoor units
- 2313/0251 . . being defrosted alternately
- 2313/0252 . . with bypasses
- 2313/02521 . . . during cooling
- 2313/02522 . . . during defrosting
- 2313/02523 . . . during heating
- 2313/0253 . . in parallel arrangements
- 2313/02531 . . . during cooling
- 2313/02532 . . . during defrosting
- 2313/02533 . . . during heating
- 2313/0254 . . in series arrangements
- 2313/02541 . . . during cooling
- 2313/02542 . . . during defrosting
- 2313/02543 . . . during heating
- 2313/027 . characterised by the reversing means
- 2313/0271 . . the compressor allows rotation in reverse direction
- 2313/0272 . . using bridge circuits of one-way valves
- 2313/02731 . . using one three-way valve
- 2313/02732 . . using two three-way valves
- 2313/02741 . . using one four-way valve
- 2313/02742 . . using two four-way valves
- 2313/02743 . . using three four-way valves
- 2313/0276 . . using six-way valves
- 2313/0278 . . using eight-way valves
- 2313/0279 . . using nine-way valves
- 2313/02791 . . using shut-off valves
- 2313/02792 . . using reversing valve changing the refrigerant flow direction due to pressure differences of the refrigerant and not by external actuation
- 2313/029 . Control issues
- 2313/0291 . . related to the pressure of the indoor unit
- 2313/0292 . . related to reversing valves
- 2313/0293 . . related to the indoor fan, e.g. controlling speed
- 2313/0294 . . related to the outdoor fan, e.g. controlling speed
- 2313/031 . Sensor arrangements
- 2313/0311 . . Pressure sensors near the expansion valve
- 2313/0312 . . Pressure sensors near the indoor heat exchanger
- 2313/0313 . . Pressure sensors near the outdoor heat exchanger
- 2313/0314 . . Temperature sensors near the indoor heat exchanger
- 2313/0315 . . Temperature sensors near the outdoor heat exchanger
- 2313/0316 . . Temperature sensors near the refrigerant heater
- 2315/00** **Sorption refrigeration cycles or details thereof**
- 2315/001 . Crystallization prevention
- 2315/002 . Generator absorber heat exchanger [GAX]
- 2315/003 . Hydrates for sorption cycles
- 2315/004 . Inert heat-exchangers
- 2315/005 . Regeneration

- 2315/006 . Reversible sorption cycles
- 2315/007 . Parallel systems therefor
- 2321/00 Details of machines, plants or systems, using electric or magnetic effects**
- 2321/001 . by using electro-caloric effects
- 2321/002 . by using magneto-caloric effects
- 2321/0021 . . with a static fixed magnet
- 2321/0022 . . with a rotating or otherwise moving magnet
- 2321/0023 . . with modulation, influencing or enhancing an existing magnetic field
- 2321/003 . by using thermionic electron cooling effects
- 2321/02 . using Peltier effects; using Nernst-Ettinghausen effects
- 2321/021 . . Control thereof
- 2321/0211 . . . of fans
- 2321/0212 . . . of electric power, current or voltage
- 2321/023 . . Mounting details thereof
- 2321/025 . . Removal of heat
- 2321/0251 . . . by a gas
- 2321/0252 . . . by liquids or two-phase fluids
- 2327/00 Compressor driving means**
- WARNING**
- Group [F25B 2327/00](#) is impacted by reclassification into groups [F25B 2327/02](#) and [F25B 2327/10](#).
- Groups [F25B 2327/00](#), [F25B 2327/02](#) and [F25B 2327/10](#) should be considered in order to perform a complete search.
- 2327/02 . using multiple power sources
- WARNING**
- Group [F25B 2327/02](#) is incomplete pending reclassification of documents from groups [F25B 2327/00](#) and [F25B 2327/12](#).
- Groups [F25B 2327/00](#), [F25B 2327/12](#) and [F25B 2327/02](#) should be considered in order to perform a complete search.
- 2327/10 . using engines
- WARNING**
- Group [F25B 2327/10](#) is incomplete pending reclassification of documents from group [F25B 2327/00](#).
- Groups [F25B 2327/00](#) and [F25B 2327/10](#) should be considered in order to perform a complete search.
- 2327/12 . . using internal combustion engines
- WARNING**
- Group [F25B 2327/12](#) is impacted by reclassification into group [F25B 2327/02](#).
- Groups [F25B 2327/12](#) and [F25B 2327/02](#) should be considered in order to perform a complete search.
- 2333/00 Details of boilers; Analysers; Rectifiers**
- 2333/001 . the generator or boiler having an analyser
- 2333/002 . the generator or boiler is heated electrically
- 2333/003 . the generator or boiler is heated by combustion gas
- 2333/004 . the generator or boiler uses an inert gas as pressure equalizing medium
- 2333/005 . the generator or boiler uses electromagnetic energy in the form of microwaves for desorbing the sorbate from the sorbate/sorbent compound
- 2333/0051 . . the energy is used for heating an auxiliary medium which is used as heating source for desorbing the sorbate from the sorbate/sorbent compound
- 2333/006 . the generator or boiler having a rectifier
- 2333/007 . the generator or boiler heated by heat exchangers with steam or hot water as heating fluid or by a secondary boiling-condensing heater
- 2339/00 Details of evaporators; Details of condensers**
- 2339/02 . Details of evaporators
- 2339/021 . . Evaporators in which refrigerant is sprayed on a surface to be cooled
- 2339/022 . . Evaporators constructed from a pair of plates forming a space in which is located a refrigerant carrying coil
- 2339/023 . . Evaporators consisting of one or several sheets on one face of which is fixed a refrigerant carrying coil
- 2339/024 . . Evaporators with refrigerant in a vessel in which is situated a heat exchanger
- 2339/0241 . . . having plate-like elements
- 2339/0242 . . . having tubular elements
- 2339/04 . Details of condensers
- 2339/041 . . of evaporative condensers
- 2339/042 . . of pcm condensers
- 2339/043 . . Condensers made by assembling plate-like or laminated elements
- 2339/044 . . Condensers with an integrated receiver
- 2339/0441 . . . containing a drier or a filter
- 2339/0442 . . . characterised by the mechanical fixation of the receiver to the header
- 2339/0443 . . . the receiver being positioned horizontally
- 2339/0444 . . . where the flow of refrigerant through the condenser receiver is split into two or more flows, each flow following a different path through the condenser receiver
- 2339/0445 . . . with throttle portions
- 2339/0446 . . . characterised by the refrigerant tubes connecting the header of the condenser to the receiver; Inlet or outlet connections to receiver
- 2339/045 . . Condensers made by assembling a tube on a plate-like element or between plate-like elements
- 2339/046 . . Condensers with refrigerant heat exchange tubes positioned inside or around a vessel containing water or pcm to cool the refrigerant gas
- 2339/047 . . Water-cooled condensers
- 2341/00 Details of ejectors not being used as compression device; Details of flow restrictors or expansion valves**
- 2341/001 . Ejectors not being used as compression device
- 2341/0011 . . Ejectors with the cooled primary flow at reduced or low pressure
- 2341/0012 . . Ejectors with the cooled primary flow at high pressure
- 2341/0013 . . Ejector control arrangements
- 2341/0014 . . Ejectors with a high pressure hot primary flow from a compressor discharge
- 2341/0015 . . using two or more ejectors

- 2341/0016 . . Ejectors for creating an oil recirculation
- 2341/06 . Details of flow restrictors or expansion valves
- 2341/062 . . Capillary expansion valves
- 2341/063 . . Feed forward expansion valves
- 2341/064 . . Superheater expansion valves
- 2341/067 . . Expansion valves having a pilot valve
- 2341/068 . . Expansion valves combined with a sensor
- 2341/0681 . . . the sensor is heated
- 2341/0682 . . . the sensor contains sorbent materials
- 2341/0683 . . . the sensor is disposed in the suction line and influenced by the temperature or the pressure of the suction gas

- 2345/00 Details for charging or discharging refrigerants; Service stations therefor**
- 2345/001 . Charging refrigerant to a cycle
- 2345/002 . Collecting refrigerant from a cycle
- 2345/003 . Control issues for charging or collecting refrigerant to or from a cycle
- 2345/004 . with several tanks to collect or charge a cycle
- 2345/005 . Service stations therefor
- 2345/0051 . . having a carrying handle
- 2345/0052 . . having wheels
- 2345/006 . characterised by charging or discharging valves
- 2345/007 . characterised by the weighing of refrigerant or oil

- 2347/00 Details for preventing or removing deposits or corrosion**
- 2347/02 . Details of defrosting cycles
- 2347/021 . . Alternate defrosting
- 2347/022 . . Cool gas defrosting
- 2347/023 . . Set point defrosting

- 2400/00 Component parts or details not otherwise provided for in this subclass**
- 2400/01 . Heaters
- 2400/02 . Centrifugal separation of gas, liquid or oil
- 2400/03 . Suction accumulators with deflectors
- 2400/04 . Refrigeration circuit bypassing means
- 2400/0401 . . for compressors
- 2400/0403 . . for condensers
- 2400/0405 . . for desuperheaters
- 2400/0407 . . for ejectors
- 2400/0409 . . for evaporators
- 2400/0411 . . for expansion valves or capillary tubes
- 2400/0413 . . for filters or driers
- 2400/0415 . . for receivers
- 2400/0417 . . for subcoolers
- 2400/0419 . . for superheaters
- 2400/0421 . . for suction line accumulators
- 2400/0423 . . for economisers
- 2400/0425 . . for internal heat exchangers
- 2400/0427 . . for oil separators
- 2400/05 . Compression system with heat exchange between particular parts of the system
- 2400/051 . . between the accumulator and another part of the cycle
- 2400/052 . . between the capillary tube and another part of the refrigeration cycle
- 2400/053 . . between the storage receiver and another part of the system
- 2400/054 . . between the suction tube of the compressor and another part of the cycle
- 2400/06 . Several compression cycles arranged in parallel

- 2400/061 . . the capacity of the first system being different from the second
- 2400/07 . Details of compressors or related parts
- 2400/071 . . Compressor mounted in a housing in which a condenser is integrated
- 2400/072 . . Intercoolers therefor
- 2400/073 . . Linear compressors
- 2400/074 . . with multiple cylinders
- 2400/075 . . with parallel compressors
- 2400/0751 . . . the compressors having different capacities
- 2400/076 . . having multiple cylinders driven by a rotating swash plate
- 2400/077 . . Compressor control units, e.g. terminal boxes, mounted on the compressor casing wall containing for example starter, protection switches or connector contacts
- 2400/08 . Refrigeration machines, plants and systems having means for detecting the concentration of a refrigerant
- 2400/09 . Refrigeration machines, plants and systems having means for detecting the concentration of a sorbent solution
- 2400/11 . Drop catchers
- 2400/12 . Inflammable refrigerants
- 2400/121 . . using R1234
- 2400/13 . Economisers
- 2400/14 . Power generation using energy from the expansion of the refrigerant
- 2400/141 . . the extracted power is not recycled back in the refrigerant circuit
- 2400/15 . Microelectro-mechanical devices
- 2400/16 . Receivers
- 2400/161 . . arranged in parallel
- 2400/162 . . characterised by the plug or stop
- 2400/17 . Re-condensers
- 2400/18 . Refrigerant conversion
- 2400/19 . Pumping down refrigerant from one part of the cycle to another part of the cycle, e.g. when the cycle is changed from cooling to heating, or before a defrost cycle is started
- 2400/21 . Modules for refrigeration systems
- 2400/22 . Refrigeration systems for supermarkets
- 2400/23 . Separators
- 2400/24 . Thermal storage element
- 2400/25 . Liquid pumps
- 2400/27 . Water as refrigerant

- 2500/00 Problems to be solved**
- 2500/01 . Geometry problems, e.g. for reducing size
- 2500/02 . Increasing the heating capacity of a reversible cycle during cold outdoor conditions
- 2500/03 . Cavitations
- 2500/04 . Clogging
- 2500/05 . Cost reduction
- 2500/06 . Damage
- 2500/07 . Exceeding a certain pressure value in a refrigeration component or cycle
- 2500/08 . Exceeding a certain temperature value in a refrigeration component or cycle
- 2500/09 . Improving heat transfers
- 2500/11 . Reducing heat transfers
- 2500/12 . Sound
- 2500/13 . Vibrations

- 2500/14 . the presence of moisture in a refrigeration component or cycle
- 2500/15 . Hunting, i.e. oscillation of controlled refrigeration variables reaching undesirable values
- 2500/16 . Lubrication
- 2500/17 . Size reduction
- 2500/18 . Optimization, e.g. high integration of refrigeration components
- 2500/19 . Calculation of parameters
- 2500/21 . Reduction of parts
- 2500/22 . Preventing, detecting or repairing leaks of refrigeration fluids
- 2500/221 . . Preventing leaks from developing
- 2500/222 . . Detecting refrigerant leaks
- 2500/23 . High amount of refrigerant in the system
- 2500/24 . Low amount of refrigerant in the system
- 2500/25 . Standardisation of apparatus or parts
- 2500/26 . characterised by the startup of the refrigeration cycle
- 2500/27 . characterised by the stop of the refrigeration cycle
- 2500/28 . Means for preventing liquid refrigerant entering into the compressor
- 2500/29 . High ambient temperatures
- 2500/31 . Low ambient temperatures
- 2500/32 . Weight
- 2600/00 Control issues**
- 2600/01 . Timing
- 2600/02 . Compressor control
- 2600/021 . . Inverters therefor
- 2600/022 . . for multi-stage operation
- 2600/023 . . controlling swash plate angles
- 2600/024 . . by controlling the electric parameters, e.g. current or voltage
- 2600/025 . . by controlling speed
- 2600/0251 . . . with on-off operation
- 2600/0252 . . . with two speeds
- 2600/0253 . . . with variable speed
- 2600/026 . . by controlling unloaders
- 2600/0261 . . . external to the compressor
- 2600/0262 . . . internal to the compressor
- 2600/027 . . by controlling pressure
- 2600/0271 . . . the discharge pressure
- 2600/0272 . . . the suction pressure
- 2600/05 . Refrigerant levels
- 2600/07 . Remote controls
- 2600/11 . Fan speed control
- 2600/111 . . of condenser fans
- 2600/112 . . of evaporator fans
- 2600/13 . Pump speed control
- 2600/15 . during shut down
- 2600/17 . by controlling the pressure of the condenser
- 2600/19 . Refrigerant outlet condenser temperature
- 2600/21 . Refrigerant outlet evaporator temperature
- 2600/23 . Time delays
- 2600/25 . Control of valves
- 2600/2501 . . Bypass valves
- 2600/2503 . . Condenser exit valves
- 2600/2505 . . Fixed-differential control valves
- 2600/2507 . . Flow-diverting valves
- 2600/2509 . . Economiser valves
- 2600/2511 . . Evaporator distribution valves
- 2600/2513 . . Expansion valves
- 2600/2515 . . Flow valves
- 2600/2517 . . Head-pressure valves
- 2600/2519 . . On-off valves
- 2600/2521 . . On-off valves controlled by pulse signals
- 2600/2523 . . Receiver valves
- 2600/2525 . . Pressure relief valves
- 2700/00 Sensing or detecting of parameters; Sensors therefor**
- 2700/01 . Sensors determining characteristics of the burner for a generator
- 2700/02 . Humidity
- 2700/03 . Oil level
- 2700/04 . Refrigerant level
- 2700/05 . Load shedding of a compressor
- 2700/06 . Piston positions of a compressor
- 2700/08 . Vapour quality, i.e. the mass fraction of vapour in the liquid-vapour mixture
- 2700/11 . Sensor to detect if defrost is necessary
- 2700/111 . . using an emitter and receiver, e.g. sensing by emitting light or other radiation and receiving reflection by a sensor
- 2700/13 . Mass flow of refrigerants
- 2700/131 . . at the outlet of a subcooler
- 2700/133 . . through the condenser
- 2700/1331 . . . at the inlet
- 2700/1332 . . . at the outlet
- 2700/135 . . through the evaporator
- 2700/1351 . . . of the cooled fluid upstream or downstream of the evaporator
- 2700/1352 . . . at the inlet
- 2700/1353 . . . at the outlet
- 2700/15 . Power, e.g. by voltage or current
- 2700/151 . . of the compressor motor
- 2700/17 . Speeds
- 2700/171 . . of the compressor
- 2700/172 . . of the condenser fan
- 2700/173 . . of the evaporator fan
- 2700/19 . Pressures
- 2700/191 . . near an expansion valve
- 2700/193 . . of the compressor
- 2700/1931 . . . Discharge pressures
- 2700/1932 . . . Oil pressures
- 2700/1933 . . . Suction pressures
- 2700/195 . . of the condenser
- 2700/197 . . of the evaporator
- 2700/198 . . Intermediate pressures
- 2700/21 . Temperatures
- 2700/2101 . . in a bypass
- 2700/2102 . . at the outlet of the gas cooler
- 2700/2103 . . near a heat exchanger
- 2700/2104 . . of an indoor room or compartment
- 2700/2105 . . Oil temperatures
- 2700/2106 . . of fresh outdoor air
- 2700/2107 . . of a Peltier element
- 2700/2108 . . of a receiver
- 2700/2109 . . of a separator
- 2700/2111 . . of a heat storage receiver
- 2700/2113 . . of a suction accumulator
- 2700/2115 . . of a compressor or the drive means therefor
- 2700/21151 . . . at the suction side of the compressor

- 2700/21152 . . . at the discharge side of the compressor
- 2700/21153 . . . of electronic components
- 2700/21154 . . . of an inverter
- 2700/21155 . . . of the oil
- 2700/21156 . . . of the motor
- 2700/21157 at the coil or rotor
- 2700/2116 . . . of a condenser
- 2700/21161 . . . of the fluid heated by the condenser
- 2700/21162 . . . of the refrigerant at the inlet of the condenser
- 2700/21163 . . . of the refrigerant at the outlet of the condenser
- 2700/2117 . . . of an evaporator
- 2700/21171 . . . of the fluid cooled by the evaporator
- 2700/21172 at the inlet
- 2700/21173 at the outlet
- 2700/21174 . . . of the refrigerant at the inlet of the evaporator
- 2700/21175 . . . of the refrigerant at the outlet of the evaporator
- 2700/2118 . . . at an intermediate pressure position