

CPC COOPERATIVE PATENT CLASSIFICATION

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

LIGHTING; HEATING

F24 HEATING; RANGES; VENTILATING (NOTE omitted)

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

NOTE

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

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| 10/00 | Solar heat collectors using working fluids | 10/72 | • • {the tubular conduits being integrated in a block; the tubular conduits touching each other} |
| 10/10 | • the working fluids forming pools or ponds | 10/73 | • • {the tubular conduits being of plastic material} |
| 10/13 | • • Salt-gradient ponds | 10/74 | • • {the tubular conduits are not fixed to heat absorbing plates and are not touching each other} |
| 10/17 | • • using covers or floating solar absorbing elements | 10/742 | • • • {the conduits being parallel to each other} |
| 10/20 | • having circuits for two or more working fluids (with means for exchanging heat between two or more fluids F24S 10/30) | 10/744 | • • • {the conduits being helically coiled} |
| 10/25 | • having two or more passages for the same working fluid layered in direction of solar-rays, e.g. having upper circulation channels connected with lower circulation channels | 10/746 | • • • {the conduits being spirally coiled} |
| 10/30 | • with means for exchanging heat between two or more working fluids | 10/748 | • • • {the conduits being otherwise bent, e.g. zig-zag} |
| 10/40 | • in absorbing elements surrounded by transparent enclosures, e.g. evacuated solar collectors | 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) |
| 10/45 | • • {the enclosure being cylindrical} | 2010/751 | • • • {Special fins} |
| 10/50 | • the working fluids being conveyed between plates | 2010/752 | • • • • {extending obliquely} |
| 10/501 | • • {having conduits of plastic material} | 10/753 | • • • {the conduits being parallel to each other} |
| 10/502 | • • {having conduits formed by paired plates and internal partition means} | 10/754 | • • • {the conduits being spirally coiled} |
| 10/503 | • • {having conduits formed by paired plates, only one of which is plane} | 10/755 | • • • {the conduits being otherwise bent, e.g. zig-zag} |
| 10/504 | • • {having conduits formed by paired non-plane plates} | 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) |
| 10/505 | • • {having curved plate-like conduits, e.g. semi-spherical} | 10/90 | • using internal thermosiphonic circulation |
| 10/506 | • • {having conduits formed by inflation of portions of a pair of joined sheets} | 10/95 | • • having evaporator sections and condenser sections, e.g. heat pipes |
| 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) | 20/00 | Solar heat collectors specially adapted for particular uses or environments |
| 10/60 | • the working fluids trickling freely over absorbing elements | 20/02 | • {for swimming pools} |
| 10/70 | • the working fluids being conveyed through tubular absorbing conduits | 20/04 | • {for showers} |
| 2010/71 | • • {the conduits having a non-circular cross-section} | 2020/10 | • {Solar modules layout; Modular arrangements} |
| | | 2020/11 | • • {in the form of multiple rows and multiple columns, all solar modules being coplanar} |
| | | 2020/12 | • • {Coplanar arrangements with frame overlapping portions} |
| | | 2020/13 | • • {Overlaying arrangements similar to roof tiles} |

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| 2020/14 | . . {Stepped arrangements, e.g. in parallel planes, without module overlapping} | 23/80 | . . {having discontinuous faces} |
| 2020/15 | . . {Non-parallel arrangements} | 23/81 | . . {flexible (F24S 23/715 , F24S 23/745 take precedence)} |
| 2020/16 | . . {Preventing shading effects} | 23/82 | . . {characterised by the material or the construction of the reflector} |
| 2020/17 | . . {Arrangements of solar thermal modules combined with solar PV modules} | 2023/83 | . . {Other shapes} |
| 2020/18 | . . {having a particular shape, e.g. prismatic, pyramidal} | 2023/831 | . . . {corrugated} |
| 2020/183 | . . . {in the form of louvers} | 2023/832 | . . . {curved} |
| 2020/186 | . . . {allowing change of position for optimization of heat collection} | 2023/833 | . . . {dish-shaped} |
| 20/20 | . Solar heat collectors for receiving concentrated solar energy, e.g. receivers for solar power plants | 2023/834 | . . . {trough-shaped} |
| 2020/23 | . . {movable or adjustable} | 2023/835 | {asymmetric} |
| 20/25 | . . using direct solar radiation in combination with concentrated radiation | 2023/836 | . . . {spiral} |
| 20/30 | . Solar heat collectors for heating objects, e.g. solar cookers or solar furnaces | 2023/837 | . . . {hyperbolic} |
| 20/40 | . Solar heat collectors combined with other heat sources, e.g. using electrical heating or heat from ambient air | 2023/838 | . . . {involutes} |
| 20/50 | . Rollable or foldable solar heat collector modules | 2023/84 | . . {Reflective elements inside solar collector casings} |
| 20/55 | . . made of flexible materials | 2023/85 | . . {Micro-reflectors} |
| 20/60 | . Solar heat collectors integrated in fixed constructions, e.g. in buildings | 2023/86 | . . {in the form of reflective coatings} |
| 20/61 | . . Passive solar heat collectors, e.g. operated without external energy source | 2023/87 | . . {Reflectors layout} |
| 20/62 | . . in the form of fences, balustrades or handrails | 2023/872 | . . . {Assemblies of spaced reflective elements on common support, e.g. Fresnel reflectors} |
| 20/63 | . . in the form of windows | 2023/874 | . . . {Reflectors formed by assemblies of adjacent similar reflective facets} |
| 20/64 | . . in the form of floor constructions, grounds or roads | 2023/876 | . . . {Reflectors formed by assemblies of adjacent reflective elements having different orientation or different features} |
| 20/66 | . . in the form of facade constructions, e.g. wall constructions (in the form of shingles or tiles F24S 20/69) | 2023/878 | . . . {Assemblies of spaced reflective elements in the form of grids, e.g. vertical or inclined reflective elements extending over heat absorbing elements} |
| 20/67 | . . in the form of roof constructions (in the form of shingles or tiles F24S 20/69) | 2023/88 | . . {Multi reflective traps} |
| 20/69 | . . in the form of shingles or tiles | 25/00 | Arrangement of stationary mountings or supports for solar heat collector modules |
| 20/70 | . Waterborne solar heat collector modules (for working fluids forming pools or ponds F24S 10/10) | | NOTE |
| 20/80 | . Airborne solar heat collector modules, e.g. inflatable structures | | Arrangements also intended for use with photovoltaic modules should further be classified in the relevant groups of subclass H02S . |
| 21/00 | Solar heat collectors not provided for in groups F24S 10/00-F24S 20/00 | 2025/01 | . {Special support components; Methods of use} |
| 23/00 | Arrangements for concentrating solar-rays for solar heat collectors | 2025/011 | . . {Arrangements for mounting elements inside solar collectors; Spacers inside solar collectors} |
| 23/10 | . {Prisms} | 2025/012 | . . {Foldable support elements} |
| 23/11 | . {Fluorescent material} | 2025/013 | . . {Stackable support elements} |
| 23/12 | . {Light guides} | 2025/014 | . . {Methods for installing support elements} |
| 23/30 | . with lenses | 2025/015 | . . {Supports with play between elements} |
| 23/31 | . . {having discontinuous faces, e.g. Fresnel lenses} | 2025/016 | . . {Filling or spacing means; Elastic means} |
| 23/70 | . with reflectors | 2025/017 | . . {Tensioning means} |
| 23/71 | . . with parabolic reflective surfaces (with cylindro-parabolic reflective surfaces F24S 23/74) | 2025/018 | . . {Means for preventing movements, e.g. stops} |
| 23/715 | . . . {flexible} | 2025/019 | . . {Means for accommodating irregularities on mounting surface; Tolerance compensation means} |
| 23/72 | . . with hemispherical reflective surfaces | 2025/02 | . . {Ballasting means} |
| 23/74 | . . with trough-shaped or cylindro-parabolic reflective surfaces | 2025/021 | . . {Sealing means between support elements and mounting surface} |
| 23/745 | . . . {flexible} | 2025/022 | . . {Sealing means between support elements, e.g. overlapping arrangements; Gap closing arrangements} |
| 23/75 | . . with conical reflective surfaces | 2025/023 | . . {Means for preventing theft; Locking means} |
| 23/77 | . . with flat reflective plates | 25/10 | . extending in directions away from a supporting surface |
| 23/79 | . . with spaced and opposed interacting reflective surfaces | 25/11 | . . using shaped bodies, e.g. concrete elements, foamed elements or moulded box-like elements |

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| 25/12 | . . using posts in combination with upper profiles | 25/67 | . . for coupling adjacent modules or their peripheral frames (for fixing modules or their peripheral frames to supporting elements F24S 25/63) |
| 25/13 | . . Profile arrangements, e.g. trusses (F24S 25/12 takes precedence) | 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 |
| 25/15 | . . using bent plates; using assemblies of plates | 2025/80 | . {Special profiles} |
| 25/16 | . . Arrangement of interconnected standing structures; Standing structures having separate supporting portions for adjacent modules | 2025/801 | . . {having hollow parts with closed cross-section} |
| 25/20 | . Peripheral frames for modules | 2025/802 | . . {having circular or oval cross-section} |
| 25/30 | . using elongate rigid mounting elements extending substantially along the supporting 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) | 2025/803 | . . {having a central web, e.g. I-shaped, inverted T-shaped} |
| 25/33 | . . forming substantially planar assemblies, e.g. of coplanar or stacked profiles | 2025/804 | . . {U-, C- or O-shaped; Hat profiles} |
| 25/35 | . . . by means of profiles with a cross-section defining separate supporting portions for adjacent modules | 2025/805 | . . {in the form of corrugated profiles} |
| 25/37 | . . . forming coplanar grids comprising longitudinal and transversal profiles | 2025/806 | . . {having curved portions} |
| 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) | 2025/807 | . . {having undercut grooves} |
| 25/50 | . comprising elongate non-rigid elements, e.g. straps, wires or ropes | 30/00 | Arrangements for moving or orienting solar heat collector modules |
| 25/60 | . Fixation means, e.g. fasteners, specially adapted for supporting solar heat collector modules | NOTE | Arrangements also intended for use with photovoltaic modules should further be classified in the relevant groups of subclass H02S. |
| 2025/6001 | . . {by using hook and loop-type fasteners} | 2030/10 | . {Special components} |
| 2025/6002 | . . {by using hooks} | 2030/11 | . . {Driving means} |
| 2025/6003 | . . {by clamping} | 2030/115 | . . . {Linear actuators, e.g. pneumatic cylinders} |
| 2025/6004 | . . {by clipping, e.g. by using snap connectors} | 2030/12 | . . {Coupling means} |
| 2025/6005 | . . {by screwed connection} | 2030/13 | . . {Transmissions} |
| 2025/6006 | . . {by using threaded elements, e.g. stud bolts} | 2030/131 | . . . {in the form of articulated bars} |
| 2025/6007 | . . {by using form-fitting connection means, e.g. tongue and groove} | 2030/132 | {in the form of compasses, scissors or parallelograms} |
| 2025/6008 | . . {by using toothed elements} | 2030/133 | . . . {in the form of flexible elements, e.g. belts, chains, ropes} |
| 2025/6009 | . . {by deforming the material, e.g. by crimping or clinching} | 2030/134 | . . . {in the form of gearings or rack-and-pinion transmissions} |
| 2025/601 | . . {by bonding, e.g. by using adhesives} | 2030/135 | . . . {in the form of threaded elements} |
| 2025/6011 | . . {by welding or brazing} | 2030/136 | . . . {for moving several solar collectors by common transmission elements} |
| 2025/6012 | . . {Joining different materials} | 2030/137 | . . . {for deriving one movement from another one, e.g. for deriving elevation movement from azimuth movement} |
| 2025/6013 | . . . {Joining glass with non-glass elements} | 2030/14 | . . {Movement guiding means} |
| 25/61 | . . for fixing to the ground or to building structures | 2030/145 | . . . {Tracks} |
| 25/613 | . . . in the form of bent strips or assemblies of strips; Hook-like connectors; Connectors to be mounted between building-covering elements | 2030/15 | . . {Bearings} |
| 25/615 | . . . for fixing to protruding parts of buildings, e.g. to corrugations or to standing seams | 2030/16 | . . {Hinged elements; Pin connections} |
| 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 | 2030/17 | . . {Spherical joints} |
| 25/63 | . . for fixing modules or their peripheral frames to supporting elements | 2030/18 | . . {Load balancing means, e.g. use of counter-weights} |
| 25/632 | . . . Side connectors; Base connectors | 2030/19 | . . {Movement dampening means; Braking means} |
| 25/634 | . . . Clamps; Clips | 30/20 | . for linear movement |
| 25/636 | clamping by screw-threaded elements | 30/40 | . for rotary movement |
| 25/65 | . . for coupling adjacent supporting elements, e.g. for connecting profiles together | 30/42 | . . with only one rotation axis |
| | | 30/422 | . . . Vertical axis |
| | | 30/425 | . . . Horizontal axis |
| | | 30/428 | . . . with inclined axis |
| | | 30/45 | . . with two rotation axes |
| | | 30/452 | . . . Vertical primary axis |
| | | 30/455 | . . . Horizontal primary axis |
| | | 30/458 | . . . with inclined primary axis |
| | | 30/48 | . . with three or more rotation axes or with multiple degrees of freedom |

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| 40/00 | Safety or protection arrangements of solar heat collectors; Preventing malfunction of solar heat collectors (control arrangements F24S 50/00) | 70/275 | <ul style="list-style-type: none"> Coatings made of plastics |
| 40/10 | <ul style="list-style-type: none"> Protective covers or shrouds; Closure members, e.g. lids (transparent coverings F24S 80/50) | 70/30 | <ul style="list-style-type: none"> Auxiliary coatings, e.g. anti-reflective coatings |
| 40/20 | <ul style="list-style-type: none"> Cleaning; Removing snow | 70/60 | <ul style="list-style-type: none"> characterised by the structure or construction (absorbing coatings or surface treatment for increasing absorption F24S 70/20; auxiliary coatings F24S 70/30) |
| 40/40 | <ul style="list-style-type: none"> Preventing corrosion; Protecting against dirt or contamination | 2070/62 | <ul style="list-style-type: none"> {Heat traps} |
| 40/42 | <ul style="list-style-type: none"> Preventing condensation inside solar modules (by venting F24S 40/53) | 70/65 | <ul style="list-style-type: none"> Combinations of two or more absorbing elements |
| 40/44 | <ul style="list-style-type: none"> Draining rainwater or condensation | 80/00 | Details, accessories or component parts of solar heat collectors not provided for in groups F24S 10/00-F24S 70/00 |
| 40/46 | <ul style="list-style-type: none"> Maintaining vacuum, e.g. by using getters | 2080/01 | <ul style="list-style-type: none"> {Selection of particular materials} |
| 40/48 | <ul style="list-style-type: none"> Deaerating or degassing the working fluid | 2080/011 | <ul style="list-style-type: none"> {Ceramics} |
| 40/50 | <ul style="list-style-type: none"> Preventing overheating or overpressure (by draining the working fluid F24S 40/60) | 2080/012 | <ul style="list-style-type: none"> {Concrete} |
| 40/52 | <ul style="list-style-type: none"> by modifying the heat collection, e.g. by defocusing or by changing the position of heat-receiving elements | 2080/013 | <ul style="list-style-type: none"> {Foams} |
| 40/53 | <ul style="list-style-type: none"> by venting solar heat collector enclosures | 2080/014 | <ul style="list-style-type: none"> {Carbone, e.g. graphite} |
| 40/55 | <ul style="list-style-type: none"> Arrangements for cooling, e.g. by using external heat dissipating means or internal cooling circuits (by venting F24S 40/53) | 2080/015 | <ul style="list-style-type: none"> {Plastics} |
| 40/57 | <ul style="list-style-type: none"> Preventing overpressure in solar collector enclosures (by venting F24S 40/53) | 2080/016 | <ul style="list-style-type: none"> {Textiles; Fabrics} |
| 40/58 | <ul style="list-style-type: none"> Preventing overpressure in working fluid circuits | 2080/017 | <ul style="list-style-type: none"> {Natural materials, e.g. wood} |
| 40/60 | <ul style="list-style-type: none"> Arrangements for draining the working fluid | 2080/018 | <ul style="list-style-type: none"> {Recycled materials} |
| 40/70 | <ul style="list-style-type: none"> Preventing freezing (arrangements for draining the working fluid F24S 40/60) | 2080/03 | <ul style="list-style-type: none"> {Arrangements for heat transfer optimization} |
| 40/80 | <ul style="list-style-type: none"> Accommodating differential expansion of solar collector elements | 2080/05 | <ul style="list-style-type: none"> {Flow guiding means; Inserts inside conduits} |
| 40/85 | <ul style="list-style-type: none"> {Arrangements for protecting solar collectors against adverse weather conditions (F24S 40/10 takes precedence)} | 2080/07 | <ul style="list-style-type: none"> {Arrangements for one-way heat transfer, e.g. thermal diodes} |
| 40/90 | <ul style="list-style-type: none"> Arrangements for testing solar heat collectors | 2080/09 | <ul style="list-style-type: none"> {Arrangements for reinforcement of solar collector elements} |
| 50/00 | Arrangements for controlling solar heat collectors | 80/10 | <ul style="list-style-type: none"> Materials for heat-exchange conduits |
| 50/20 | <ul style="list-style-type: none"> for tracking | 80/20 | <ul style="list-style-type: none"> Working fluids specially adapted for solar heat collectors |
| 2050/25 | <ul style="list-style-type: none"> {Calibration means; Methods for initial positioning of solar concentrators or solar receivers} | 80/30 | <ul style="list-style-type: none"> Arrangements for connecting the fluid circuits of solar collectors with each other or with other components, e.g. pipe connections; Fluid distributing means, e.g. headers |
| 50/40 | <ul style="list-style-type: none"> responsive to temperature | 80/40 | <ul style="list-style-type: none"> Casings |
| 50/60 | <ul style="list-style-type: none"> responsive to wind | 80/45 | <ul style="list-style-type: none"> characterised by the material |
| 50/80 | <ul style="list-style-type: none"> for controlling collection or absorption of solar radiation | 80/453 | <ul style="list-style-type: none"> made of metallic material |
| 60/00 | Arrangements for storing heat collected by solar heat collectors (working fluids forming pools or ponds F24S 10/10) | 80/457 | <ul style="list-style-type: none"> made of plastics |
| 60/10 | <ul style="list-style-type: none"> using latent heat | 80/50 | <ul style="list-style-type: none"> Elements for transmitting incoming solar rays and preventing outgoing heat radiation; Transparent coverings |
| 60/20 | <ul style="list-style-type: none"> using chemical reactions, e.g. thermochemical reactions or isomerisation reactions | 2080/501 | <ul style="list-style-type: none"> {Special shape} |
| 60/30 | <ul style="list-style-type: none"> storing heat in liquids | 2080/502 | <ul style="list-style-type: none"> {in the form of multiple covering elements} |
| 70/00 | Details of absorbing elements | 2080/503 | <ul style="list-style-type: none"> {in the form of curved covering elements} |
| 70/10 | <ul style="list-style-type: none"> characterised by the absorbing material (absorbing coatings or surface treatment for increasing absorption F24S 70/20) | 80/52 | <ul style="list-style-type: none"> characterised by the material (for preventing heat loss F24S 80/56) |
| 70/12 | <ul style="list-style-type: none"> made of metallic material | 80/525 | <ul style="list-style-type: none"> made of plastics |
| 70/14 | <ul style="list-style-type: none"> made of plastics | 80/54 | <ul style="list-style-type: none"> using evacuated elements |
| 70/16 | <ul style="list-style-type: none"> made of ceramic; made of concrete; made of natural stone | 80/56 | <ul style="list-style-type: none"> characterised by means for preventing heat loss |
| 70/20 | <ul style="list-style-type: none"> characterised by absorbing coatings; characterised by surface treatment for increasing absorption | 80/58 | <ul style="list-style-type: none"> characterised by their mountings or fixing means |
| 70/225 | <ul style="list-style-type: none"> for spectrally selective absorption | 80/60 | <ul style="list-style-type: none"> Thermal insulation (transparent coverings F24S 80/50) |
| 70/25 | <ul style="list-style-type: none"> Coatings made of metallic material | 80/65 | <ul style="list-style-type: none"> characterised by the material |
| | | 80/70 | <ul style="list-style-type: none"> Sealing means |
| | | 90/00 | Solar heat systems not otherwise provided for |
| | | 90/10 | <ul style="list-style-type: none"> using thermosiphonic circulation |
| | | 2201/00 | Prediction; Simulation |