

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

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

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

40/00	Safety or protection arrangements of solar heat collectors; Preventing malfunction of solar heat collectors (control arrangements F24S 50/00)	70/275	. . Coatings made of plastics
		70/30	. Auxiliary coatings, e.g. anti-reflective coatings
40/10	. Protective covers or shrouds; Closure members, e.g. lids (transparent coverings F24S 80/50)	70/60	. characterised by the structure or construction (absorbing coatings or surface treatment for increasing absorption F24S 70/20 ; auxiliary coatings F24S 70/30)
40/20	. Cleaning; Removing snow		
40/40	. Preventing corrosion; Protecting against dirt or contamination	2070/62	. . { Heat traps }
40/42	. . Preventing condensation inside solar modules (by venting F24S 40/53)	70/65	. . Combinations of two or more absorbing elements
40/44	. . Draining rainwater or condensation		
40/46	. . Maintaining vacuum, e.g. by using getters	80/00	Details, accessories or component parts of solar heat collectors not provided for in groups F24S 10/00-F24S 70/00
40/48	. . Deaerating or degassing the working fluid	2080/01	. { Selection of particular materials }
40/50	. Preventing overheating or overpressure (by draining the working fluid F24S 40/60)	2080/011	. . { Ceramics }
40/52	. . by modifying the heat collection, e.g. by defocusing or by changing the position of heat-receiving elements	2080/012	. . { Concrete }
40/53	. . by venting solar heat collector enclosures	2080/013	. . { Foams }
40/55	. . Arrangements for cooling, e.g. by using external heat dissipating means or internal cooling circuits (by venting F24S 40/53)	2080/014	. . { Carbone, e.g. graphite }
40/57	. . Preventing overpressure in solar collector enclosures (by venting F24S 40/53)	2080/015	. . { Plastics }
40/58	. . Preventing overpressure in working fluid circuits	2080/016	. . { Textiles; Fabrics }
40/60	. Arrangements for draining the working fluid	2080/017	. . { Natural materials, e.g. wood }
40/70	. Preventing freezing (arrangements for draining the working fluid F24S 40/60)	2080/018	. . { Recycled materials }
40/80	. Accommodating differential expansion of solar collector elements	2080/03	. { Arrangements for heat transfer optimization }
40/85	. . { Arrangements for protecting solar collectors against adverse weather conditions (F24S 40/10 takes precedence) }	2080/05	. . { Flow guiding means; Inserts inside conduits }
40/90	. Arrangements for testing solar heat collectors	2080/07	. . { Arrangements for one-way heat transfer, e.g. thermal diodes }
50/00	Arrangements for controlling solar heat collectors	2080/09	. { Arrangements for reinforcement of solar collector elements }
50/20	. for tracking	80/10	. Materials for heat-exchange conduits
2050/25	. . { Calibration means; Methods for initial positioning of solar concentrators or solar receivers }	80/20	. Working fluids specially adapted for solar heat collectors
50/40	. responsive to temperature	80/30	. 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
50/60	. responsive to wind	80/40	. Casings
50/80	. for controlling collection or absorption of solar radiation	80/45	. . characterised by the material
60/00	Arrangements for storing heat collected by solar heat collectors (working fluids forming pools or ponds F24S 10/10)	80/453	. . . made of metallic material
60/10	. using latent heat	80/457	. . . made of plastics
60/20	. using chemical reactions, e.g. thermochemical reactions or isomerisation reactions	80/50	. Elements for transmitting incoming solar rays and preventing outgoing heat radiation; Transparent coverings
60/30	. storing heat in liquids	2080/501	. . { Special shape }
70/00	Details of absorbing elements	2080/502	. . . { in the form of multiple covering elements }
70/10	. characterised by the absorbing material (absorbing coatings or surface treatment for increasing absorption F24S 70/20)	2080/503	. . . { in the form of curved covering elements }
70/12	. . made of metallic material	80/52	. . characterised by the material (for preventing heat loss F24S 80/56)
70/14	. . made of plastics	80/525	. . . made of plastics
70/16	. . made of ceramic; made of concrete; made of natural stone	80/54	. . using evacuated elements
70/20	. characterised by absorbing coatings; characterised by surface treatment for increasing absorption	80/56	. . characterised by means for preventing heat loss
70/225	. . for spectrally selective absorption	80/58	. . characterised by their mountings or fixing means
70/25	. . Coatings made of metallic material	80/60	. Thermal insulation (transparent coverings F24S 80/50)
		80/65	. . characterised by the material
		80/70	. Sealing means
		90/00	Solar heat systems not otherwise provided for
		90/10	. using thermosiphonic circulation
		Prediction; Simulation	
		2201/00	Prediction; Simulation