

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

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}

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	. . . {involute}
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	25/67	. . 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

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