

# 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

<b>10/00</b>	<b>Solar heat collectors using working fluids</b>	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 ( <a href="#">with means for exchanging heat between two or more fluids F24S 10/30</a> )	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 ( <a href="#">collectors comprising porous material or permeable masses directly contacting the working fluids F24S 10/80</a> )
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 ( <a href="#">for conveying liquefied working fluid from evaporator sections to condenser sections with capillary force F24S 10/95</a> )
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 ( <a href="#">collectors comprising porous materials or permeable masses directly contacting the working fluids F24S 10/80</a> )	<b>20/00</b>	<b>Solar heat collectors specially adapted for particular uses or environments</b>
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 ( <a href="#">F24S 23/715</a> , <a href="#">F24S 23/745</a> 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 ( <a href="#">in the form of shingles or tiles F24S 20/69</a> )	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 ( <a href="#">in the form of shingles or tiles F24S 20/69</a> )	2023/88	. . {Multi reflective traps}
20/69	. . in the form of shingles or tiles	25/00	<b>Arrangement of stationary mountings or supports for solar heat collector modules</b>
20/70	. Waterborne solar heat collector modules ( <a href="#">for working fluids forming pools or ponds F24S 10/10</a> )		<b>NOTE</b>
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 <a href="#">H02S</a> .
21/00	<b>Solar heat collectors not provided for in groups <a href="#">F24S 10/00-F24S 20/00</a></b>	2025/01	. {Special support components; Methods of use}
23/00	<b>Arrangements for concentrating solar-rays for solar heat collectors</b>	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 ( <a href="#">with cylindro-parabolic reflective surfaces F24S 23/74</a> )	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	<b>30/00</b>	<b>Arrangements for moving or orienting solar heat collector modules</b>
25/60	. Fixation means, e.g. fasteners, specially adapted for supporting solar heat collector modules	<b>NOTE</b>	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

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