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
10/10 . the working fluids forming pools or ponds
10/13 . Salt-gradient ponds
10/17 . using covers or floating solar absorbing elements
10/20 . having circuits for two or more working fluids (with means for exchanging heat between two or more fluids F24S 10/30)
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
10/30 . with means for exchanging heat between two or more working fluids
10/40 . in absorbing elements surrounded by transparent enclosures, e.g. evacuated solar collectors
10/45 . [the enclosure being cylindrical]
10/50 . the working fluids being conveyed between plates
10/501 . [having conduits of plastic material]
10/502 . [having conduits formed by paired plates and internal partition means]
10/503 . [having conduits formed by paired plates, only one of which is plane]
10/504 . [having conduits formed by paired non-plane plates]
10/505 . [having curved plate-like conduits, e.g. semi-spherical]
10/506 . [having conduits formed by inflation of portions of a pair of joined sheets]
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)
10/60 . the working fluids trickling freely over absorbing elements
10/70 . the working fluids being conveyed through tubular absorbing conduits
2010/71 . [the conduits having a non-circular cross-section]

10/72 . [the tubular conduits being integrated in a block; the tubular conduits touching each other]
10/73 . [the tubular conduits being of plastic material]
10/74 . [the tubular conduits are not fixed to heat absorbing plates and are not touching each other]
10/742 . [the conduits being parallel to each other]
10/744 . [the conduits being helically coiled]
10/746 . [the conduits being spirally coiled]
10/748 . [the conduits being otherwise bent, e.g. zig-zag]
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)
2010/751 . [Special fins]
2010/752 . . . [extending obliquely]
2010/753 . . . (the conduits being parallel to each other)
2010/754 . . . (the conduits being spirally coiled)
2010/755 . . . (the conduits being otherwise bent, e.g. zig-zag)
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)

WARNING
Group F24S 10/80 is impacted by reclassification into group F24S 10/95. Groups F24S 10/80 and F24S 10/95 should be considered in order to perform a complete search.
10/90 . using internal thermosiphonic circulation

**WARNING**

Group F24S 10/90 is incomplete pending reclassification of documents from group F24S 90/10.

Group F24S 10/90 is also impacted by reclassification into groups F24S 10/95 and F24S 90/10.

All groups listed in this Warning should be considered in order to perform a complete search.

10/95 . having evaporator sections and condenser sections, e.g. heat pipes

**WARNING**

Group F24S 10/95 is incomplete pending reclassification of documents from groups F24S 10/80, F24S 10/90, and F24S 90/10.

Groups F24S 10/80, F24S 10/90, and F24S 90/10, and F24S 10/95 should be considered in order to perform a complete search.

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20/00 Solar heat collectors specially adapted for particular uses or environments

**WARNING**

Group F24S 20/00 is incomplete pending reclassification of documents from group F24S 21/00.

Groups F24S 20/00 and F24S 21/00 should be considered in order to perform a complete search.

20/02 . (for swimming pools)

20/04 . (for showers)

20/10 . [Solar modules layout; Modular arrangements]

20/11 . [in the form of multiple rows and multiple columns, all solar modules being coplanar]

20/12 . [Coplanar arrangements with frame overlapping portions]

20/13 . [Overlying arrangements similar to roof tiles]

20/14 . [Stepped arrangements, e.g. in parallel planes, without module overlapping]

20/15 . [Non-parallel arrangements]

20/16 . [Preventing shading effects]

20/17 . [Arrangements of solar thermal modules combined with solar PV modules]

20/18 . [having a particular shape, e.g. prismatic, pyramidal]

20/183 . [in the form of louvers]

20/186 . [allowing change of position for optimization of heat collection]

20/20 . Solar heat collectors for receiving concentrated solar energy, e.g. receivers for solar power plants

20/23 . [movable or adjustable]

20/25 . using direct solar radiation in combination with concentrated radiation

20/30 . Solar heat collectors for heating objects, e.g. solar cookers or solar furnaces

**WARNING**

Group F24S 20/30 is impacted by reclassification into group F24S 50/20.

Groups F24S 20/30 and F24S 50/20 should be considered in order to perform a complete search.

20/40 . Solar heat collectors combined with other heat sources, e.g. using electrical heating or heat from ambient air

20/50 . Rollable or foldable solar heat collector modules

**WARNING**

Group F24S 20/50 is impacted by reclassification into group F24S 20/55.

Groups F24S 20/50 and F24S 20/55 should be considered in order to perform a complete search.

20/55 . made of flexible materials

**WARNING**

Group F24S 20/55 is incomplete pending reclassification of documents from group F24S 20/50.

Groups F24S 20/50 and F24S 20/55 should be considered in order to perform a complete search.

20/60 . Solar heat collectors integrated in fixed constructions, e.g. in buildings

20/61 . Passive solar heat collectors, e.g. operated without external energy source

20/62 . in the form of fences, balustrades or handrails

20/63 . in the form of windows

20/64 . in the form of floor constructions, grounds or roads

20/66 . in the form of facade constructions, e.g. wall constructions (in the form of shingles or tiles F24S 20/69)

**WARNING**

Group F24S 20/66 is impacted by reclassification into group F24S 20/69.

Groups F24S 20/66 and F24S 20/69 should be considered in order to perform a complete search.

20/67 . in the form of roof constructions (in the form of shingles or tiles F24S 20/69)

20/69 . in the form of shingles or tiles

**WARNING**

Group F24S 20/69 is incomplete pending reclassification of documents from group F24S 20/66.

Groups F24S 20/66 and F24S 20/69 should be considered in order to perform a complete search.
20/70  . Waterborne solar heat collector modules (for working fluids forming pools or ponds F24S 10/10)

WARNING

All groups listed in this Warning should be considered in order to perform a complete search.

20/80  . Airborne solar heat collector modules, e.g. inflatable structures

21/00  Solar heat collectors not provided for in groups F24S 10/00-F24S 20/00

WARNING
Group F24S 21/00 is impacted by reclassification into group F24S 20/00.

Groups F24S 21/00 and F24S 20/00 should be considered in order to perform a complete search.

23/00  Arrangements for concentrating solar-rays for solar heat collectors

WARNING
Group F24S 23/00 is impacted by reclassification into group F24S 50/20.

Groups F24S 23/00 and F24S 50/20 should be considered in order to perform a complete search.

23/10  . [Prisms]
23/11  . [Fluorescent material]
23/12  . [Light guides]
23/30  . with lenses
23/31  . (having discontinuous faces, e.g. Fresnel lenses)
23/70  . with reflectors
23/71  . with parabolic reflective surfaces (with cylindro-parabolic reflective surfaces F24S 23/74)

WARNING
Group F24S 23/71 is impacted by reclassification into group F24S 23/74.

Groups F24S 23/71 and F24S 23/74 should be considered in order to perform a complete search.

23/715  . [flexible]
23/72  . with hemispherical reflective surfaces
23/74  . with trough-shaped or cylindro-parabolic reflective surfaces

WARNING
Group F24S 23/74 is incomplete pending reclassification of documents from group F24S 23/71.

Groups F24S 23/71 and F24S 23/74 should be considered in order to perform a complete search.

23/745  . [flexible]
23/75  . with conical reflective surfaces
23/77  . with flat reflective plates

23/79  . with spaced and opposed interacting reflective surfaces
23/80  . [having discontinuous faces]
23/81  . [flexible (F24S 23/715, F24S 23/745 take precedence)]
23/82  . [characterised by the material or the construction of the reflector]
2023/83  . [Other shapes]
2023/831  . [corrugated]
2023/832  . [curved]
2023/833  . [dish-shaped]
2023/834  . [trough-shaped]
2023/835  . [asymmetric]
2023/836  . [spiral]
2023/837  . [hyperbolic]
2023/838  . [involutes]
2023/84  . [Reflective elements inside solar collector casings]
2023/85  . [Micro-reflectors]
2023/86  . [in the form of reflective coatings]
2023/87  . [Reflectors layout]
2023/872  . [Assemblies of spaced reflective elements on common support, e.g. Fresnel reflectors]
2023/874  . [Reflectors formed by assemblies of adjacent similar reflective facets]
2023/876  . [Reflectors formed by assemblies of adjacent reflective elements having different orientation or different features]
2023/878  . [Assemblies of spaced reflective elements in the form of grids, e.g. vertical or inclined reflective elements extending over heat absorbing elements]
2023/88  . [Multi reflective traps]

WARNING
Group F24S 2023/88 is impacted by reclassification into group F24S 2070/62.

Groups F24S 2023/88 and F24S 2070/62 should be considered in order to perform a complete search.

25/00  Arrangement of stationary mountings or supports for solar heat collector modules

NOTE
Arrangements also intended for use with photovoltaic modules should further be classified in the relevant groups of subclass H02S.

2025/01  . [Special support components; Methods of use]
2025/011  . [Arrangements for mounting elements inside solar collectors; Spacers inside solar collectors]
2025/012  . [Foldable support elements]
2025/013  . [Stackable support elements]
2025/014  . [Methods for installing support elements]
2025/015  . [Supports with play between elements]
2025/016  . [Filling or spacing means; Elastic means]
2025/017  . [Tensioning means]
2025/018  . [Means for preventing movements, e.g. stops]
2025/019  . [Means for accommodating irregularities on mounting surface; Tolerance compensation means]
2025/02  . [Ballasting means]
supporting solar heat collector modules
Fixation means, e.g. fasteners, specially adapted for comprising elongate non-rigid elements, e.g. straps, surface F24S (extending in directions away from a supporting or corrugated plates; Plate-like module frames using plate-like mounting elements, e.g. profiled)

F24S 25/10
Peripheral frames for modules
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)

F24S 25/33
formally forming substantially planar assemblies, e.g. of coplanar or stacked profiles
by means of profiles with a cross-section defining separate supporting portions for adjacent modules
forming coplanar grids comprising longitudinal and transversal profiles
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)
comprising elongate non-rigid elements, e.g. straps, wires or ropes
Fixation means, e.g. fasteners, specially adapted for supporting solar heat collector modules
by means of profiled connections, e.g. stud bolts
by using form-fitting connection means, e.g. tongue and groove
by using toothed elements
by deformation of the material, e.g. by crimping or clinching
by bonding, e.g. by using adhesives
by welding or brazing
by using wrench or gaskets
Joining different materials
Joining glass with non-glass elements
for fixing to the ground or to building structures
in the form of bent strips or assemblies of strips; Hook-like connectors; Connectors to be mounted between building-covering elements
for fixing to protruding parts of buildings, e.g. to corrugations or to standing seams

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
for fixing modules or their peripheral frames to supporting elements
Side connectors; Base connectors
Clamps; Clips
clamping by screw-threaded elements
for coupling adjacent supporting elements, e.g. for connecting profiles together
for coupling adjacent modules or their peripheral frames (for fixing modules or their peripheral frames to supporting elements F24S 25/63)
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

Special profiles
having hollow parts with closed cross-section
having circular or oval cross-section
having a central web, e.g. I-shaped, inverted T-shaped
(U-, C- or O-shaped; Hat profiles)
in the form of corrugated profiles
having curved portions
having undercut grooves

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.

WARNING
Group F24S 30/00 is incomplete pending reclassification of documents from groups F24S 20/70 and F24S 30/20
Groups F24S 20/70, F24S 30/20, and F24S 30/00 should be considered in order to perform a complete search.

Special components
Driving means
Linear actuators, e.g. pneumatic cylinders
Coupling means
Transmissions
in the form of articulated bars
in the form of compasses, scissors or parallelograms
in the form of flexible elements, e.g. belts, chains, ropes
in the form of gearings or rack-and-pinion transmissions
in the form of threaded elements
for moving several solar collectors by common transmission elements
for deriving one movement from another one, e.g. for deriving elevation movement from azimuth movement
Movement guiding means
Tracks
WARNING
Group F24S 30/20 is incomplete pending reclassification of documents from group F24S 20/70. Groups F24S 20/70, F24S 30/20, and F24S 30/00 should be considered in order to perform a complete search.

30/045 . . . with two rotation axes

WARNING
Group F24S 30/45 is incomplete pending reclassification of documents from group F24S 20/70. Groups F24S 20/70 and F24S 30/45 should be considered in order to perform a complete search.

30/452 . . . Vertical primary axis

WARNING
Group F24S 30/452 is incomplete pending reclassification of documents from group F24S 20/70. Groups F24S 20/70 and F24S 30/452 should be considered in order to perform a complete search.

30/455 . . . Horizontal primary axis

WARNING
Group F24S 30/455 is incomplete pending reclassification of documents from group F24S 20/70. Groups F24S 20/70 and F24S 30/455 should be considered in order to perform a complete search.

30/458 . . . with inclined primary axis

WARNING
Group F24S 30/458 is incomplete pending reclassification of documents from group F24S 20/70. Groups F24S 20/70 and F24S 30/458 should be considered in order to perform a complete search.

30/48 . . . with three or more rotation axes or with multiple degrees of freedom

WARNING
Group F24S 30/48 is incomplete pending reclassification of documents from group F24S 20/70. Groups F24S 20/70 and F24S 30/48 should be considered in order to perform a complete search.
Safety or protection arrangements of solar heat collectors; Preventing malfunction of solar heat collectors (control arrangements F24S 50/00)

**WARNING**

Group F24S 40/00 is impacted by reclassification into group F24S 40/90. Groups F24S 40/00 and F24S 40/90 should be considered in order to perform a complete search.

40/00
- Protective covers or shrouds; Closure members, e.g. lids (transparent coverings F24S 80/50)
- Cleaning; Removing snow
- Preventing corrosion; Protecting against dirt or contamination
- Preventing condensation inside solar modules (by venting F24S 40/53)

**WARNING**

Group F24S 40/42 is impacted by reclassification into group F24S 40/53. Groups F24S 40/42 and F24S 40/53 should be considered in order to perform a complete search.

40/40
- Draining rainwater or condensation
- Maintaining vacuum, e.g. by using getters
- Deaerating or degassing the working fluid
- Preventing overheating or overpressure (by draining the working fluid F24S 40/60)
- by modifying the heat collection, e.g. by defocusing or by changing the position of heat-receiving elements
- by venting solar heat collector enclosures

**WARNING**

Group F24S 40/53 is incomplete pending reclassification of documents from group F24S 40/42. Groups F24S 40/42 and F24S 40/53 should be considered in order to perform a complete search.

40/50
- Arrangements for cooling, e.g. by using external heat dissipating means or internal cooling circuits (by venting F24S 40/53)
- Preventing overpressure in solar collector enclosures (by venting F24S 40/53)
- Preventing overpressure in working fluid circuits
- Arrangements for draining the working fluid
- Preventing freezing (arrangements for draining the working fluid F24S 40/60)
- Accommodating differential expansion of solar collector elements
- Arrangements for protecting solar collectors against adverse weather conditions (F24S 40/10 takes precedence)

**WARNING**

Group F24S 40/90 is incomplete pending reclassification of documents from group F24S 40/00. Groups F24S 40/00 and F24S 40/90 should be considered in order to perform a complete search.

40/90
- Arrangements for testing solar heat collectors

**WARNING**

Group F24S 50/20 is incomplete pending reclassification of documents from groups F24S 20/30 and F24S 23/00. Groups F24S 50/20 and F24S 50/20 should be considered in order to perform a complete search.

50/20
- for tracking

**WARNING**

Group F24S 60/00 is impacted by reclassification into groups F24S 60/10 and F24S 60/20. Groups F24S 60/00, F24S 60/10, and F24S 60/20 should be considered in order to perform a complete search.

60/10
- using latent heat

**WARNING**

Group F24S 60/10 is incomplete pending reclassification of documents from groups F24S 60/00 and F24S 60/30. Groups F24S 60/00, F24S 60/30, and F24S 60/10 should be considered in order to perform a complete search.

60/20
- using chemical reactions, e.g. thermochemical reactions or isomerisation reactions

**WARNING**

Group F24S 60/20 is incomplete pending reclassification of documents from groups F24S 60/00 and F24S 60/30. Groups F24S 60/00, F24S 60/30, and F24S 60/20 should be considered in order to perform a complete search.

60/30
- Arrangements for storing heat collected by solar heat collectors (working fluids forming pools or ponds F24S 10/10)
storing heat in liquids

**WARNING**

Group F24S 60/30 is impacted by reclassification into groups F24S 60/10 and F24S 60/20.

Groups F24S 60/30, F24S 60/10, and F24S 60/20 should be considered in order to perform a complete search.

70/00 Details of absorbing elements

**WARNING**

Group F24S 70/00 is incomplete pending reclassification of documents from group F24S 80/00.

Groups F24S 80/00 and F24S 70/00 should be considered in order to perform a complete search.

70/10 . characterised by the absorbing material (absorbing coatings or surface treatment for increasing absorption F24S 70/20)

70/12 . made of metallic material

70/14 . made of plastics

70/16 . made of ceramic; made of concrete; made of natural stone

70/20 . characterised by absorbing coatings; characterised by surface treatment for increasing absorption

**WARNING**

Group F24S 70/20 is impacted by reclassification into group F24S 70/225.

Groups F24S 70/20 and F24S 70/225 should be considered in order to perform a complete search.

70/225 . for spectrally selective absorption

**WARNING**

Group F24S 70/225 is incomplete pending reclassification of documents from groups F24S 70/20, F24S 70/225, and F24S 70/275.

All groups listed in this Warning should be considered in order to perform a complete search.

70/25 . Coatings made of metallic material

**WARNING**

Group F24S 70/25 is impacted by reclassification into group F24S 70/225.

Groups F24S 70/25 and F24S 70/225 should be considered in order to perform a complete search.

70/275 . Coatings made of plastics

**WARNING**

Group F24S 70/275 is impacted by reclassification into group F24S 70/225.

Groups F24S 70/275 and F24S 70/225 should be considered in order to perform a complete search.

70/30 . Auxiliary coatings, e.g. anti-reflective coatings

70/60 . characterised by the structure or construction (absorbing coatings or surface treatment for increasing absorption F24S 70/20; auxiliary coatings F24S 70/30)

2070/62 . [Heat traps]

**WARNING**

Group F24S 2070/62 is incomplete pending reclassification of documents from group F24S 2023/88.

Groups F24S 2023/88 and F24S 2070/62 should be considered in order to perform a complete search.

70/65 . Combinations of two or more absorbing elements

80/00 Details, accessories or component parts of solar heat collectors not provided for in groups F24S 10/00-F24S 70/00

**WARNING**

Group F24S 80/00 is impacted by reclassification into group F24S 70/00.

Groups F24S 80/00 and F24S 70/00 should be considered in order to perform a complete search.

2080/01 . [Selection of particular materials]

2080/011 . [Ceramics]

2080/012 . [Concrete]

2080/013 . [Foams]

2080/014 . [Carbone, e.g. graphite]

2080/015 . [Plastics]

2080/016 . [Textiles; Fabrics]

2080/017 . [Natural materials, e.g. wood]

2080/018 . [Recycled materials]

2080/03 . [Arrangements for heat transfer optimization]

2080/05 . [Flow guiding means; Inserts inside conduits]

2080/07 . [Arrangements for one-way heat transfer, e.g. thermal diodes]

2080/09 . [Arrangements for reinforcement of solar collector elements]

80/10 . Materials for heat-exchange conduits

80/20 . Working fluids specially adapted for solar heat collectors

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

80/40 . Casings

80/45 . characterised by the material

80/453 . . made of metallic material

80/457 . . made of plastics

80/50 . Elements for transmitting incoming solar rays and preventing outgoing heat radiation; Transparent coverings

**WARNING**

Group F24S 80/50 is impacted by reclassification into groups F24S 80/56 and F24S 80/58.

Groups F24S 80/50, F24S 80/56, and F24S 80/58 should be considered in order to perform a complete search.

2080/501 . [Special shape]

2080/502 . [in the form of multiple covering elements]
Group F24S 80/52 is impacted by reclassification into groups F24S 80/56 and F24S 80/58. Groups F24S 80/52, F24S 80/56, and F24S 80/58 should be considered in order to perform a complete search.

Group F24S 80/525 is impacted by reclassification into groups F24S 80/56 and F24S 80/58. Groups F24S 80/525, F24S 80/56, and F24S 80/58 should be considered in order to perform a complete search.

Group F24S 80/54 is impacted by reclassification into groups F24S 80/56 and F24S 80/58. Groups F24S 80/54, F24S 80/56, and F24S 80/58 should be considered in order to perform a complete search.

Group F24S 80/56 is incomplete pending reclassification of documents from groups F24S 80/50, F24S 80/52, F24S 80/525, and F24S 80/54. All groups listed in this Warning should be considered in order to perform a complete search.

Group F24S 80/58 is incomplete pending reclassification of documents from groups F24S 80/50, F24S 80/52, F24S 80/525, and F24S 80/54. All groups listed in this Warning should be considered in order to perform a complete search.

Group F24S 90/10 is incomplete pending reclassification of documents from group F24S 10/90. Group F24S 90/10 is also impacted by reclassification into groups F24S 10/90 and F24S 10/95. All groups listed in this Warning should be considered in order to perform a complete search.

Group F24S 90/10 is also impacted by reclassification into groups F24S 10/90 and F24S 10/95. All groups listed in this Warning should be considered in order to perform a complete search.

Thermal insulation (transparent coverings)

Solar heat systems not otherwise provided for