Selectively coated, %100 thermally contacted fins and absorbers for highly efficient solar thermal applications

The difference of thermal capacity produced by “Single point of contact” versus “100% surface contact”

Absorber strips provide a long life length and high performance for market-leading solar collectors. The high efficiency and low power loss of the strips make them particularly suited for demanding applications in large solar collectors.

High performance

The high performance of the absorber strips is the result of the combination of a highly selective surface and excellent fin efficiency and heat transfer properties. The rhomboid shape of the copper tubing helps maintain a turbulent flow in the pipe, which improves heat transfer to the heating medium and makes it possible to operate with a low fluid volume – thus reducing dynamic heat loss.
An environmentally friendly choice
The production process involves minimal environmental impact and the sputtering technique used for coating generates no residue. The absorber strips are made of copper and aluminium, giving them a low weight, high rigidity, and low life cycle costs (LCA analysis). The entire product can be returned to us for recycling.

Long life length
The protective layer boosts the life length of the strips. The Swedish Institute for Research and Testing (SP) has carried out a range of tests on the sputtered absorbers (cf.96M32494). The tests were carried out in accordance with the requirements and methods laid down by IEA (International Energy Agency) Task X and included tests of the surface’s resistance to condensation and high temperatures. The test results were approved and the values obtained translate into a useful product life of more than 25 years.

Type and Dimensions

<table>
<thead>
<tr>
<th>TYPE MM</th>
<th>PIPE AREA (MM²)</th>
<th>PIPE THICKNESS (MM)</th>
<th>FLANGE THICKNESS (MM)</th>
<th>WEIGHT (KG/M)</th>
<th>PROPORTION CU/AL</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>60</td>
<td>0.6 (0.35+0.25)</td>
<td>0.5±0.05</td>
<td>0.191±0.000</td>
<td>Cu 50.3%, 96gr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>Al 49.7%, 95gr</td>
</tr>
<tr>
<td>122</td>
<td>60</td>
<td>0.6 (0.35+0.25)</td>
<td>0.5±0.05</td>
<td>0.261±0.000</td>
<td>Cu 36.8%, 96gr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>Al 63.2%, 165gr</td>
</tr>
<tr>
<td>143</td>
<td>60</td>
<td>0.6 (0.35+0.25)</td>
<td>0.5±0.05</td>
<td>0.289±0.000</td>
<td>Cu 33.2%, 96gr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>Al 66.8%, 193gr</td>
</tr>
</tbody>
</table>

Strips lengths: Produced in 600-7000 mm lengths.
**Flange lengths:**  Strips can be produced with 0, 7 or 40 mm extended flange, see below.

**Connections:**  After cutting, all strips is round formed to d₁ 10mm.

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**Performance**

**Absorption:**  96% (± 2%)

**Emission:**  7% (± 2%)

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**Quality and quality control**

**Strips**

Static pressure test:  3.0 MPa (30 bar). Performed on each strip in production.

Pressure strike test:  1.0Mpa (10 bar) minimum 3,000 strikes

**Complete Absorbers**

Leakage test:  Leakage test 1,1 Mpa (11bar) for 2 minutes.

Other:  All included strips are tested according to procedure above.

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**Strength test of strips and soldered absorbers**

Pressure withstands:  50Bar at 180°C *

* Pressure withstands tests performed by SP

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**Durability performance**

The sputtered surface fulfil all requirement issued by International Energy Agency IEA, annex X
Labelling
All coils/strips are labelled with a six-digit number, e.g. 143511, which means it is produced year 2014, week 35 and coil number 11.

Selective surface, sputtered technology
Coating of the selective surface is performed in an industrial sputtering chamber with reactive magnetron sputtering in vacuum. The coating is performed in three stages with different characteristics.

Layer 1: Corrosion protection layer
Layer 2: Absorbing layer
Layer 3: Transparent anti reflex coating
Colour: Blue

Strips can be produced either with single or double sided selective surface.

Other features
Inner pipe channel fins: Rhombic form contributes to turbulent flow, which increases heat recovering.
Metallurgic attachment: 100% thermal attachment between flange and copper pipe.

Water specification
To prevent damages to the solar collector system, the water used need to be of a certain quality (see table below).

A corrosion-inhibiting liquid shall be added to the water. In systems placed in areas where the temperature go below 0° Celsius, an anti-freezing liquid shall also be added to the water. The anti-freezing liquid may be glycol or glycol with corrosion inhibitors. For correct mixing of liquid, please follow the instructions given by the manufacturer or supplier of the corrosion-inhibiting/anti-freezing liquid.

In an open system, the consumption of corrosion inhibiting liquid will be higher, which will require more supervision and checking of the water.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acidity (pH)</td>
<td>7.5-9.0</td>
</tr>
<tr>
<td>Hardness (°dH)</td>
<td>4.0-8.5</td>
</tr>
<tr>
<td>Total hardness (mmol/l CaO)</td>
<td>0.7-1.5</td>
</tr>
<tr>
<td>Ratio $\text{HCO}_3^-/\text{SO}_4^{2-}$ (meas. mg/l)</td>
<td>$&gt;1$</td>
</tr>
<tr>
<td>Ratio $\text{HCO}_3^-/\text{Cl}$ (meas. mg/l)</td>
<td>High</td>
</tr>
<tr>
<td>Sulphate $\text{SO}_4$ (mg/l)</td>
<td>$&lt;100$</td>
</tr>
<tr>
<td>Chloride $\text{Cl}$ (mg/l)</td>
<td>$&lt;100$</td>
</tr>
<tr>
<td>Carbon dioxide, $\text{CO}_2$ (mg/l)</td>
<td>$&lt;10$</td>
</tr>
</tbody>
</table>
### Characteristics of Water Good for Copper Pipes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron, Fe (mg/l)</td>
<td>&lt; 0.2</td>
</tr>
<tr>
<td>Manganese, Mn (mg/l)</td>
<td>&lt;0.2</td>
</tr>
<tr>
<td>Alkalinity HCO₃</td>
<td>70-300</td>
</tr>
<tr>
<td>Solid substance</td>
<td>&lt;20 mg/l</td>
</tr>
</tbody>
</table>

The table shows characteristics for water that is good to use in copper pipes.

**Special thermal collector for hot air generation; solar AIR®**

solar AIR® is a special air collector, developed for residential and industrial hot air generation. Suitable for agricultural crop drying, laundry drying and space heating applications, the collector can be manufactured with and without inbuilt fans. Model with DC fan is equipped with a special PWM circuit, regulating the fan speed and air flow volumes based on the solar irradiation levels. The DC fan is powered by a photovoltaic PV module integrated to the casing. The collector can be manufactured at various air/flow size and capacities according to the applications. Incorporating filters at the inlet and air exits, the collectors can be connected in parallel / series configuration to serve for different regimes. The possibility of roof and facade mounting, provides the end users...
with low cost solar energy contribution in their process hot air requirements.

solar thermal facade integrated collectors
for aesthetic and efficient architectural applications

Solar Facade, is a facade integrated solar thermal collector, designed for modern double layer, enveloped glazing architectural facades which require active performance. The collector components are:

**ABSORBER:** 1-Highly Efficient, Selectively Coated Sunstrip 122 Absorbers (%95a-%5e)
*122 mm strips / 0.75 m² absorber area / 0.76 lt static thermal capacity
*Static Pressure 30 Bar / Operational Pressure 10 Bar

**INSULATION:** 1-134.A CFC Free, Monoblock Injected Poyurethane (40kg/m3)
2-Foiled Glass Wool/ Black Glass Tule Coated Glass Wool

**CASING:** ASA Composite Monoblock Polymer

**GLAZING:** 1-Low Iron, Tempered Double Glaze 18 mm
2-Low Iron, Tempered, Flat 4mm

**GASKETING:** High UV and Heat Rezistant EPDM / Silicone

**COLLECTOR EFFICIENCY FACTOR** ($F'$)