ALPOLIC/fr SCM is a stainless steel composite panel composed of non-combustible mineral filled core and two sheets of 0.3mm thick stainless steel. Both sides of stainless steel are NSSC220M, a highly rust-resistant ferric stainless steel, which has an outstanding rust resistance comparable to stainless steel 316. ALPOLIC/fr SCM is suitable for external claddings and roof coverings of buildings.

1. Features
ALPOLIC/fr SCM has the following features:
(1) Flatness: SCM panel has the excellent flatness derived from the continuous laminating process.
(2) Rigidity: As one of the attributes of composite panels, SCM is rigid and lightweight. SCM 4mm is equivalent to stainless steel 2.9mm thick in rigidity, and reduces the weight by 55%.
(3) Corrosion resistance: NSSC220M, with Mo, Nb, Ti contents, has an outstanding rust-resistance comparable to SUS316.
(4) Fire safety: The core has the same contents as ALPOLIC/fr, and SCM has a fire approval for exterior and interior uses in Japan.

Note on processing method: To cope with the low machinability of stainless steel, we need special machines and tools for cutting and grooving SCM panel. Refer to “6. Processing method” below.

2. Material composition
ALPOLIC/fr SCM is composed of non-combustible mineral filled core sandwiched between 0.3mm thick stainless steel sheets.

- Topside skin: 0.3mm thick stainless steel sheet, NSSC220M, a highly rust-resistant ferric stainless steel
- Core material: Non-combustible mineral filled core
- Backside skin: 0.3mm thick stainless steel sheet, NSSC220M, a highly rust-resistant ferric stainless steel

3. Surface finish
Hairline Finish and Dull Finish

Note: For other finishes, please contact local distributors or our office.

4. Panel dimension and tolerance
Panel thickness: 4mm
Standard panel size Width: 1000mm
Length: Less than 5000mm

Note: 1219mm wide product is available upon request. Contact local distributors or our office.

Product tolerance Width: +/-2.0mm
Length: +/-4.0mm
Thickmess: +/-0.2mm
Bow: +/-0.5% (5mm/m) of the length and/or width
Square-ness (diagonal difference): Maximum 5.0mm

5. Characteristics

(1) Physical properties

<table>
<thead>
<tr>
<th>Method</th>
<th>Unit</th>
<th>SCM 4mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific gravity</td>
<td>-</td>
<td>2.5</td>
</tr>
<tr>
<td>Weight</td>
<td>kg/m²</td>
<td>10.2</td>
</tr>
<tr>
<td>Thermal expansion</td>
<td>ASTM D696</td>
<td>×10⁻⁶/°C 10.4</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>ASTM D976</td>
<td>W/(m.K) 0.40</td>
</tr>
<tr>
<td>Thermal resistance</td>
<td>ASTM D976</td>
<td>m².K/W 0.16</td>
</tr>
<tr>
<td>Deflection temperature</td>
<td>ASTM D648</td>
<td>°C 117</td>
</tr>
</tbody>
</table>

(2) Mechanical properties of composite material

<table>
<thead>
<tr>
<th>Method</th>
<th>Unit</th>
<th>SCM 4mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength</td>
<td>ASTM E8</td>
<td>MPa, N/mm² 84</td>
</tr>
<tr>
<td>0.2% proof stress</td>
<td>ASTM E8</td>
<td>MPa, N/mm² 69</td>
</tr>
<tr>
<td>Elongation</td>
<td>ASTM E8</td>
<td>% 12.6</td>
</tr>
<tr>
<td>Flexural elasticity, E</td>
<td>ASTM C393</td>
<td>GPa, kN/mm² 70.6</td>
</tr>
<tr>
<td>Flexural rigidity, E×I</td>
<td>ASTM C393</td>
<td>k N.mm²/mm 372</td>
</tr>
<tr>
<td>Punching shear resistance</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Shear resistance</td>
<td>ASTM D732</td>
<td>MPa, N/mm² 55</td>
</tr>
</tbody>
</table>

(3) Impact resistance by Du-pont method

<table>
<thead>
<tr>
<th>Steel ball weight, kg</th>
<th>Height, mm</th>
<th>Dent depth, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>300</td>
<td>0.5</td>
</tr>
<tr>
<td>0.5</td>
<td>500</td>
<td>1.1</td>
</tr>
<tr>
<td>1.0</td>
<td>300</td>
<td>1.3</td>
</tr>
<tr>
<td>1.0</td>
<td>500</td>
<td>1.6</td>
</tr>
</tbody>
</table>

(4) Mechanical properties of skin metals

<table>
<thead>
<tr>
<th>Method</th>
<th>Unit</th>
<th>Stainless steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSSC220M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2% proof stress</td>
<td>ASTM E8</td>
<td>MPa, N/mm² 295</td>
</tr>
<tr>
<td>Flexural elasticity</td>
<td>ASTM C393</td>
<td>GPa, kN/mm² 201</td>
</tr>
</tbody>
</table>

(5) Sound transmission loss
The chart shows the airborne sound transmission loss measured on SCM 4mm. The STC (sound transmission class) is 30dB in accordance with ASTM E413.
6. Processing method

The machinability of stainless steel is low, and we need special machines and tools for cutting and grooving SCM panels. We recommend the following processing methods for SCM:

(1) Cutting

Use square shear for straight cutting. Small clearance (0.1 mm or less) and 1°30’ rake angle is suitable. Comparatively large droop appears at cut edge.

We can also use CNC router for cutting SCM panels. Complicated cutting as well as straight cutting is possible with CNC router. Use square end mill made of ceramic-coated super hard alloy.

Note: Panel saws and regular circular saws are not suitable for SCM panels.

(2) Grooving

Use CNC router for grooving SCM panels. Firstly cut the backside skin with square end mill, and secondly remove the core with regular carbide-tipped bit. And then we obtain the V-shaped groove shown in the diagram. Use a square end mill made of ceramic coated super hard alloy to cut the backside skin.

We can also use V-cut machine (planer) for stainless steel sheet for grooving SCM panels.

Note: Panel saws equipped with V-cutter are not applicable to SCM panels.
(3) Folding and assembly
We can fold V-grooved panels with a folding jig in the same manner as ACM panels. To produce a tray type panel (route & return panel), we normally groove the panel at 25mm from edges, remove the four corners by notching tool and fold the four sides. After assembly, the corners are sealed with sealant from backside to prevent from water penetration, if necessary.

(4) Bending with press brake
We use press brake or 3-roll bender for bending SCM panels. In bending with press brake, use a top die having almost the same radius as the final bending radius. The smallest bendable limit is approx. 100mmR. In bending with press brake, edges tend to extend like a saddle. Confirm the curved shape with pre-testing.

(5) Bending with 3-roll bender
We can use 3-roll bender for curving SCM panels. The smallest bendable radius is approx. 200mmR. The gap between rolls should have some allowance (0.3-0.5mm) in order not to constrict SCM panel between rolls.

(6) Joining with accessories - in terms of galvanic corrosion
If we use dissimilar metals for assembly, we have to design the panel detail to prevent the dissimilar metals from galvanic corrosion. Stainless steel is a noble metal in corrosion potential, and it is likely that the less noble metal corrodes with galvanic corrosion in a moist condition. Use rivet and bolt/nut made of stainless steel for joining. Use angle and flange made of stainless steel for accessory, if possible. When aluminum extrusions are used for accessory, insulate the aluminum surface electrically with anodizing or paint coating.

(7) Safety precautions on fabrication work
a. The panel edge is as sharp as a knife. Wear gloves for safety in handling SCM.
b. During working with CNC router, wear safety glasses for protection of eyes.

7. Cleaning
NSSC220M is hardly rust, but not rust-free. Rust is in most cases caused by cohesion of harmful components such as floating metal particles, a detrimental component from exhaust gas and a salty component in coastal area. We have to remove these components from the SCM surface with periodic cleaning. Refer to the separate cleaning manual.

8. General notes
(1) Optical difference by direction
SCM shows optical difference between directions as metallic-paint colors do. Therefore, it is important to arrange SCM panels in the same direction to avoid the optical (color) difference.
(2) Color variation among production lots
It is possible that the color of SCM slightly varies among production lots and the inconsistent color is visible after installation. This is caused by the slight color difference between stainless steel coils. In order to prevent this problem, we recommend placing the total requirement in one order or allotting the panels with a grouping arrangement.

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