Sandwich panels for cold storage facilities
Product description
Ruukki SP2E PU

Ruukki SP2E PU sandwich panels with rigid polyurethane core are intended for use in industrial buildings as cladding for walls and roofs of stationary cold storage facilities. Ruukki SP2E PU panels are featured with high values of heat resistance, guaranteeing excellent thermal insulating power of walls and roofs. Thanks to that, the panels may be twice as thin as the panels with other cores, offering a considerable reduction of freight and installation costs.

Product application
- cold stores
- refrigerated warehouses

Ruukki is a metal expert you can rely on all the way, whenever you need metal based materials, components, systems or total solutions. We constantly develop our product range and operating models to match your needs.
### General information

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<td>M05/S12</td>
<td>Roof panel suspension – option 2 (cross-section as seen perpendicular to load-bearing beam).</td>
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<td>M05/S13</td>
<td>Roof panel suspension.</td>
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### Accessories for Ruukki SP2E PU

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- EA1B72 corner flashing
- EA1B73 joint flashing
- EA1B74 joint flashing
- EA1B75 joint flashing
- K1 cap
- K2 cap
- L50 supporting steel sheet
- L51 supporting steel sheet
- L52 sleeve
- L56 supporting steel sheet
- L53 fastener
- L54 fastener
- L55 fastener
Product range
Ruukki SP2E PU panels are composed of two external facings made of steel sheets and a structural insulation core of rigid polyurethane foam featured with excellent thermal insulation properties.

Panel facings are made of metal sheet galvanised on both sides. Facing parameters comply with the parameters of S280GD+Z275 or S320GD+Z275 steel in accordance with PN-EN 10326:2006. Standard versions of the sheets are polyester coated. For corrosive environments as well as for the use in food and chemical industries, we offer sheets with PVDF.

In case of facilities with extra hygiene requirements like food production/storage, panel facings may be made of PVC(F) or stainless steel X5CrNi18-10 type (1.4301) acc. to PN-EN 10088-1:2007 of 0.55 mm or 0.60 mm in thickness. PVC(F) facing can be used only from the internal side of the building.

Film is added on both sides to protect panels against physical damage during loading, unloading, storage and installation.

The core is made of HCFC-free, rigid, self-extinguishing polyurethane foam expanded with environmentally safe pentane.

Produced in a continuous process, the polyurethane core is highly homogenous thus providing excellent and repeatable thermal and mechanical properties on a consistent basis. The foam’s density is of 40±5 kg/m³, whereas its design thermal conductivity ratio \( \lambda_{\text{calc}} = 0.021 \text{ W/m·K} \) in temp. 0°C.

Features
Ruukki panels with polyurethane cores are featured with a very low thermal conductivity coefficient. Thanks to that, the panels may be twice as thin as the panels with other cores (e.g. a polystyrene core), offering a considerable reduction of freight and assembly costs, still keeping the structure’s required thermal insulation.

Longitudinal profiled edges of panels creating tongue-and-groove system with double scarf joint on the outside and inside and butyl sealing compound applied during assembly, guarantee joint tightness, even if there are heavy temperature or moisture differences on both sides of the partition wall made of Ruukki SP2E PU panels.

The panels are featured with good mechanical properties stemming from the properties of polyurethane itself and from durable and reliable joint between the core and steel facings. Polyurethane is resistant to chemical agents and biological corrosion. It is not attacked either by rodents or insects.

Notice
Detailed solutions introduced here are recommended by Ruukki Polska, but the final decision related to the shape of a particular solution is taken by designer.
Technical specifications of Ruukki SP2E PU sandwich panels with polyurethane core

<table>
<thead>
<tr>
<th>Panel type and thickness [mm]</th>
<th>External facing thickness [mm]</th>
<th>Internal facing thickness [mm]</th>
<th>Modular panel width [mm]</th>
<th>Maximum panel length L [m]</th>
<th>Panel weight [kg/m²]</th>
<th>U value* [W/m²K]</th>
<th>Technical approvals and certificates</th>
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</thead>
<tbody>
<tr>
<td>SP2E PU 120</td>
<td>0.50</td>
<td>0.50</td>
<td>1100</td>
<td>18.5</td>
<td>13.9</td>
<td>0.17</td>
<td>Quality Certificate ISO 9001:2000</td>
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<tr>
<td></td>
<td></td>
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<td></td>
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<td>National Conformity Declaration</td>
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<td>11/2008</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hygienic Certificate HK/B/1804/01/2007</td>
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<tr>
<td>SP2E PU 160</td>
<td>0.50</td>
<td>0.50</td>
<td>1100</td>
<td>18.5</td>
<td>15.7</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td>SP2E PU 180</td>
<td>0.50</td>
<td>0.50</td>
<td>1100</td>
<td>18.5</td>
<td>16.6</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>SP2E PU 200</td>
<td>0.50</td>
<td>0.50</td>
<td>1100</td>
<td>18.5</td>
<td>17.5</td>
<td>0.10</td>
<td></td>
</tr>
</tbody>
</table>

* the heat transmittance value U was calculated for the λ_{corr} value of 0.021 [W/m.K] and includes impact of linear thermal bridge on panel joint

Ruukki SP2E PU panels are produced in a wide range of steel facing profiling available

<table>
<thead>
<tr>
<th>Panel type</th>
<th>Internal facing</th>
<th>External facing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruukki SP2E120PU</td>
<td>L</td>
<td>F*</td>
</tr>
<tr>
<td>Ruukki SP2E160PU</td>
<td>L</td>
<td>F*</td>
</tr>
<tr>
<td>Ruukki SP2E180PU</td>
<td>L</td>
<td>F*</td>
</tr>
<tr>
<td>Ruukki SP2E200PU</td>
<td>L</td>
<td>F*</td>
</tr>
</tbody>
</table>

* In case of the flat profiling type, the facing surface may be slightly corrugated. FF combinations are designed for partition walls only.
● **Panel designations**

<table>
<thead>
<tr>
<th>Panel type</th>
<th>Panel thickness</th>
<th>External facing profile</th>
<th>Internal facing profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruukki SP2E120PU LL</td>
<td>120</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

**Table 3**

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**Panel joints**

At the moment of leaving the production line, Ruukki SP2E PU panels are ready to install. Precise tongue-and-groove system makes assembly easier and faster.

**Panel joint description**

1. Rigid, HCFC-free and self-extinguishing environmentally and ozone friendly polyurethane foam core of excellent thermal insulation.
2. Properly milled core improves thermal insulation and joint tightness.
3. Large bend radii on facings ensure that none of the protective coat properties is lost.
4. Facing profile conforming with the standards applicable to cooling and food industries ensures uniform facade appearance.
5. Double scarf joint from outer and inner sides increases fire-tightness and facilitates assembly.
6. 3 mm gap enables additional joint closure with durably elastic mass.
8. Butyl sealing compound eliminates air and moisture penetration, applied at building site.
9. Durably elastic sealing compound of Sikaflex PRO3WF type (compulsory for ceilings, optional for walls), applied at building site.

Ruukki SP2E PU panels are installed on the load-bearing structure with use of special sets of fasteners – see page 8.

Ruukki SP2E PU panel joint is fixed to the structure with use of a set of fasteners including poliamid sleeves.

Ruukki SP2E PU panel joint is fixed to the structure with use of a set of self-drilling fasteners made of stainless steel.
**Areas of application**

Ruukki SP2E PU panels are intended for use in industrial building as cladding for walls and roofs of stationary cold storage facilities designed for indoor temperature ranging between 0°C > t > –50°C.

Roof sections should be protected from sun exposure with additional covers (such as corrugated steel sheets).

Space between the additional cover and the roof must be ventilated. The temperature on panel surface should not exceed 60°C.

Optimal thickness of Ruukki SP2E PU panel, the facing and coating types are selected by the designer, depending on intended use, the facility operating conditions, possible impact of internal environmental factors and weather conditions.

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**Areas of application of Ruukki SP2E PU sandwich panels**

<table>
<thead>
<tr>
<th>Panel thickness [mm]</th>
<th>Heat resistance [m²·K/W]</th>
<th>Minimum internal temperature $t_w$ [ºC]</th>
<th>Temperature difference $\Delta t^*$ [K]</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>5.884</td>
<td>-10</td>
<td>50</td>
</tr>
<tr>
<td>160</td>
<td>7.789</td>
<td>-30</td>
<td>70</td>
</tr>
<tr>
<td>180</td>
<td>8.741</td>
<td>-40</td>
<td>80</td>
</tr>
<tr>
<td>200</td>
<td>9.694</td>
<td>-50</td>
<td>90</td>
</tr>
</tbody>
</table>

Notice:

$t_{\text{internal, calculation}} = 0.4 t_{\text{monthly average}} + 0.6 t_{\text{max}}$ – where ($t_{\text{monthly average}}$) denotes the average temperature in the hottest month of the year while ($t_{\text{max}}$) denotes the maximum temperature of outdoor air in the area of facility.

$\Delta t^*$ difference between internal temperature ($t_w$) and the computational outdoor temperature ($t_{\text{external, calculation}}$) in the aimed area

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**Thermal performance**

U thermal transmittance values for inner panel layers are given in table 1 - see page 4. $X$ and $U_c$ thermal transmittance values are presented in Table 5.

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**Point thermal transmittance coefficient ($C$) and partition thermal transmittance coefficient ($U_c$) of Ruukki SP2E PU sandwich panels**

<table>
<thead>
<tr>
<th>Panel thickness [mm]</th>
<th>X [W/K]</th>
<th>$U_c$ [W/m²·K]</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>0.00</td>
<td>0.17</td>
</tr>
<tr>
<td>160</td>
<td>0.00</td>
<td>0.13</td>
</tr>
<tr>
<td>180</td>
<td>0.00</td>
<td>0.11</td>
</tr>
<tr>
<td>200</td>
<td>0.00</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Notice:

For the computational thermal conductivity ratio $\lambda_{\text{calc}} = 0.021$ W/m·K.
**Structural performance**

Depending on load capacity and rigidity, Ruukki SP2E PU sandwich panels may be applied as single- and multi-span wall and roof covering elements, for which maximum span lengths do not exceed those presented in table 6 and 7 (buildings up to 10 m high located in 1 zone or 2 zone of wind load according to PN-77/B-02011, A area – the value of load capacity is 0.77 kN/m², and the value of the computational load capacity is 1.0 kN/m²).

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### Maximum span lengths of Ruukki SP2E PU panels used as wall elements of cold storage and refrigerated warehouse not covered with a tropic

<table>
<thead>
<tr>
<th>Panel type</th>
<th>Internal temperature [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0°C</td>
</tr>
<tr>
<td>SP2E120PU</td>
<td>5.60</td>
</tr>
<tr>
<td>SP2E160PU</td>
<td>6.90</td>
</tr>
<tr>
<td>SP2E180PU</td>
<td>7.30</td>
</tr>
<tr>
<td>SP2E200PU*</td>
<td>8.05</td>
</tr>
</tbody>
</table>

*Notice:*
The table concerns panels with external light coloured facings.

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### Maximum span lengths of Ruukki SP2E PU panels used as roof elements covered with a tropic

<table>
<thead>
<tr>
<th>Panel type</th>
<th>Internal temperature [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0°C</td>
</tr>
<tr>
<td>SP2E120PU</td>
<td>7.10</td>
</tr>
<tr>
<td>SP2E160PU</td>
<td>7.75</td>
</tr>
<tr>
<td>SP2E180PU</td>
<td>8.30</td>
</tr>
<tr>
<td>SP2E200PU*</td>
<td>8.30</td>
</tr>
</tbody>
</table>

*Notice:*
The table concerns panels with external light coloured facings.

* acc. to Ruukki Polska’s assessment
• **Corrosion resistance**
  Owing to the application of properly selected organic coatings, constituting the final protective layer for (external and/or internal) Ruukki sandwich panel facings or non-standard facings (external and/or internal) – depending on particular demands – various corrosion resistance can be achieved.

Studies carried out by the Durability and Corrosion Protection Department of the ITB (Building Research Institute), aimed at assessment and classification of corrosion resistance of the coatings and facings listed below showed that:

- Ruukki sandwich panels with standard polyester coatings (25 mm thickness) are suitable for use in C1 to C3 environments according to ISO 12944-2:2001.
- Ruukki non-standard sandwich panels with PVDF coatings (25 mm thickness) are suitable for use in C1 to C3 environments according to ISO 12944-2:2001.
- Ruukki non-standard sandwich panels with PVC coatings (120 mm thickness) are suitable for use in C1 to C3 environments according to ISO 12944-2:2001.
- Ruukki non-standard sandwich panels with stainless steel facings are suitable for use in C1 to C4 environments according to ISO 12944-2001.

• **Corrosivity categories and examples of typical environments in accordance with EN ISO 12944-2**

**Corrosivity category C1:**
Interior – heated building with clean atmospheres, e.g. offices, shops, schools, hotels.

**Corrosivity category C2:**
Exterior – atmospheres with low level of pollution, mostly rural areas.

Interior – unheated buildings where condensations may occur, e.g. depots, sports halls.

**Corrosivity category C3:**
Exterior – urban and industrial atmospheres, moderate sulfur dioxide pollution, coastal areas with low salinity.

Interior – production rooms with high humidity and some air pollution, e.g. food-processing plants, laundries, breweries, dairies.

• **Fasteners for panel assembly**
  Ruukki SP2E PU panels are fixed to the supporting structure with use of:
  - one set of fasteners including a poliamid sleeve and supporting stainless steel sheet, two screws and the washer – the wind suction load of one set is 1.90 kN (for panels with stainless steel facings and organic coatings),
  - one set of fasteners including a poliamid sleeve and supporting stainless steel sheet, two screws and the washer – wind suction load of one set is 1.90 kN (for panels with stainless steel facings),
  - self-drilling fasteners made of stainless steel and the sealing washer with EPDM vulcanised layer – wind suction load of one fastener is 1.0 kN.

  The solution ensures efficient assembly, secures assembling and makes it possible to avoid point thermal bridges.

Investors using their own fasteners should pay special attention to ensuring their adequate corrosion protection.

• **Acoustic performance**
  Ruukki SP2E PU panels are featured with the following minimum acoustic insulation coefficients:
  \[
  R_w \geq 25 \text{ dB}, R_{a1} \geq 23 \text{ dB}, R_{a2} \geq 20 \text{ dB}.
  \]

  From the acoustic point of view, Ruukki SP2E PU panels are suited for use:
  - as external cladding and partition walls/roofs for cold stores and refrigerated warehouses unless individual acoustic insulation specifications for such walls/roofs are higher than those given on the left,
  - to erect cold stores and refrigerated warehouses with no specified acoustic requirements.

• **Fire performance**
  Walls and roofs made of Ruukki SP2E PU panels are classified as NRO – non-fire spreading.
General panel assembly guidelines

- Before assembly, check structure for compliance with design specifications and construction accuracy.
- Prior to assembly, remove protective film from internal panel facings. Film on external facings should be removed soon after assembly, however, not later than 2 months after panel purchase (Fig. 1).
  Caution: Ruukki SP2E PU wall panels are covered with blue film that comes on the internal of structure.
- Panels and flashings should be cutted on stands covered with a soft material (such as felt or polystyrene) to protect coating from damaging.
- It is recommended to cut panels with fine-toothed blades and to cut flashings with snips. Do not use angle (Fig. nr 2)!
- During assembly, press panels into place with fixing tool 1410 (made by Ruukki Polska) – the tool helps to ensure proper piece joining without risking any damage.
- 3÷4 mm width of gap in panel joint is recommended to apply permanently elastic sealing compound correctly (see page 22 – M05/S01 detail).
- Panels should be fixed to structures with fasteners recommended by sandwich panels manufacturer. Any other fasteners should be pre-approved by the manufacturer.

Sealing materials

- Butyl sealing compounds – Sikalastomer 710, Butylene-X.
- Permanently elastic sealing compounds – Sikaflex PRO3WF,
- Sealing compounds increasing fire resistance – Terostat MS-939,
- Sealing compounds for passes of assembly conduits in roof – Terostat MS-9320 i MS-930.
• Accessories for Ruukki SP2E PU panels

**EA1B50 drip wall flashing**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Length [mm]</th>
<th>Weight [kg]</th>
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<tr>
<td>EA1B50A</td>
<td>3000</td>
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![Diagram of EA1B50A drip wall flashing](image)
### EA1B71 corner flashing

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</table>
## EA1B72 corner flashing

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<tr>
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<tr>
<td>EA1B72B</td>
<td>4000</td>
<td>2.80</td>
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![Diagram of EA1B72 corner flashing](image-url)
- **EA1B73 joint flashing**

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<td>EA1B73B</td>
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<td>2.13</td>
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![Diagram of EA1B73 joint flashing](Image)
### EA1B74 joint flashing

<table>
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<th>Symbol</th>
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<td>EA1B74B</td>
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![Diagram of EA1B74 joint flashing]

### EA1B75 joint flashing

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![Diagram of EA1B75 joint flashing]
**K1 cap**

<table>
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<tr>
<th>Material</th>
<th>Weight</th>
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<tbody>
<tr>
<td>polythene</td>
<td>1g</td>
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![Diagram of K1 cap]
- **K2 cap**
  
<table>
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<th>Weight</th>
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<tbody>
<tr>
<td>polythene</td>
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- **L50 supporting steel sheet**
  
<table>
<thead>
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<th>Symbol</th>
<th>a [mm]</th>
<th>g [mm]</th>
<th>Weight [kg]</th>
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<tr>
<td>L50A</td>
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<td>0.04</td>
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<tr>
<td>L50B</td>
<td>70</td>
<td>3</td>
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<tr>
<td>L50C</td>
<td>70</td>
<td>4</td>
<td>0.12</td>
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</table>

  **Material:**
  Zinc-coated and powder painted steel sheet (RAL 9010).

- **L51 supporting steel sheet**
  
<table>
<thead>
<tr>
<th>Symbol</th>
<th>a [mm]</th>
<th>Weight [kg]</th>
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<tbody>
<tr>
<td>L51A</td>
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<td>0.05</td>
</tr>
<tr>
<td>L51B</td>
<td>70</td>
<td>0.12</td>
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</table>

  **Material:**
  Zinc-coated and powder painted steel sheet (RAL 9010).
L52 sleeve

<table>
<thead>
<tr>
<th>Symbol</th>
<th>L [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>L52A</td>
<td>110</td>
<td>0.029-0.060</td>
</tr>
<tr>
<td>L52B</td>
<td>150</td>
<td>0.039-0.082</td>
</tr>
<tr>
<td>L52C</td>
<td>170</td>
<td>0.045-0.093</td>
</tr>
<tr>
<td>L52D</td>
<td>190</td>
<td>0.051-0.104</td>
</tr>
</tbody>
</table>

L56 supporting steel sheet

<table>
<thead>
<tr>
<th>Symbol</th>
<th>a [mm]</th>
<th>g [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>L50A</td>
<td>40</td>
<td>3</td>
<td>0.04</td>
</tr>
<tr>
<td>L56B</td>
<td>70</td>
<td>3</td>
<td>0.09</td>
</tr>
<tr>
<td>L56C</td>
<td>70</td>
<td>4</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Material:
Zinc-coated and powder painted steel sheet (RAL 9010).
## L53 fastener

<table>
<thead>
<tr>
<th>Symbol</th>
<th>d [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>L53A</td>
<td>9</td>
<td>0.74</td>
</tr>
<tr>
<td>L53B</td>
<td>11</td>
<td>0.74</td>
</tr>
</tbody>
</table>

![Diagram of L53 fastener with dimensions]
### L54 fastener

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>L54</td>
<td>0.67</td>
</tr>
</tbody>
</table>

### L55 fastener

<table>
<thead>
<tr>
<th>Symbol</th>
<th>b [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>L55A</td>
<td>9</td>
<td>0.87</td>
</tr>
<tr>
<td>L55B</td>
<td>11</td>
<td>0.86</td>
</tr>
</tbody>
</table>
• M05/S001
  Ruukki sandwich panel cladding for cold storage facility – layout of installation details.
- **M05/S002**
  Ruukki sandwich panel cladding for cold storage facility – layout of installation details.
- **M05/S01**
  Joint between Ruukki SP2E PU panels.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. Butyl sealing compound.
M05/S02
Joint between frozen warehouse wall and socle.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. EA1B50 drip wall flashing or custom ordered flashing.
3. ø4x10 Al/Fe white blind rivet (every ~300).
4. Sikaflex 221 type permanently elastic sealing compound, min. ø5 mm.
5. Zinc-coated angle, e.g. 60x100 (optional).
6. Protection of the substrate against frost damage (acc. to architectural design of the structure).
7. Vapour barrier.
**M05/S03**

Corner joint between wall panels – option 1.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. EA1B71 corner flashing.
3. EA1B75 joint flashing.
4. ø4.8x14.6 watertight rivet (every ~300).
5. Assembling foam.
6. Sikaflex 221 type permanently elastic sealing compound.
7. ø4x10 Al/Fe white blind rivet (every ~300).
8. Bituminous sealing tape (e.g. SikaSeal).
M05/S04
Corner joint between wall panels – option 2.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. EA1B71 corner flashing.
3. Internal corner strip.
4. Fastening strip.
5. Assembling foam.
6. Sikaflex 221 type permanently elastic sealing compound.
7. ø4x10 Al/Fe white blind rivet (every ~300).
8. ø4.8x14.6 Al/Fe watertight rivet (every ~300).
9. Bituminous sealing tape (e.g. SikaSeal).
• M05/S05
Corner joint between wall and roof panel.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. EA1B71 corner flashing.
3. EA1B72 corner flashing.
4. ø4.8x14.6 watertight rivet (every ~300).
5. Assembling foam.
6. Sikaflex 221 type permanently elastic sealing compound.
7. ø4x10 Al/Fe white blind rivet (every ~300).
8. Bituminous sealing tape (e.g. SikaSeal).
- **M05/S06**
  Joint between wall panel and sheeting rail – option 1.

1. Steel elements acc. to engineering design of the structure.
2. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
3. L52 sleeve.
4. L50A supporting steel sheet.
5. M10xL Fe/Zn5 screw.
6. 10.5 Fe/Zn5 washer.
7. Sikaflex 221 type permanently elastic sealing compound.
**M05/S08**
Joint between wall panel and sheeting rail – option 3.

1. Steel elements acc. to engineering design of the structure.
2. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
3. Self-drilling fastener or self-tapping fastener made of austenitic steel.

* selection of fasteners acc. to manufacturer’s recommendations (e.g. Ejot Flash).
- M05/S09
  Joint between wall panel and sheeting rail – option 4.

1. Steel elements acc. to engineering design of the structure.
2. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
3. L52 sleeve.
4. L50 supporting steel sheet.
5. M10xL Fe/Zn5 screw.
6. 10.5 Fe/Zn5 washer.
7. Sikaflex 221 type permanently elastic sealing compound.
10. L54 fastener.
- **M05/S10**
  Roof panel suspension – option 1 (cross-section as seen perpendicular to load-bearing beam).

1. Steel elements acc. to engineering design of the structure.
2. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
3. L52 sleeve.
4. L50 supporting steel sheet.
5. PVC self-adhesive tape separator.
6. M10xL Fe/Zn5 screw.
7. 10.5 Fe/Zn5 washer.
8. Sikaflex 221 type permanently elastic sealing compound.
• M05/S11
  Roof panel suspension – option 2 (cross-section as seen perpendicular to load-bearing beam).

1. Steel elements acc. to engineering design of the structure.
2. Ruukki SP2E120PU, SP2E160PU, S2PE180PU, SP2E200PU sandwich panel.
3. L52 sleeve.
4. L50 supporting steel sheet.
5. PVC self-adhesive tape separator.
6. M10xL Fe/Zn5 screw.
7. 10.5 Fe/Zn5 washer.
8. Sikaflex 221 type permanently elastic sealing compound.
- **M05/S12**
  
  Roof panel suspension – option 2  
  (cross-section as seen parallel to load-bearing beam).

1. Steel elements acc. to engineering design of the structure.
2. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
4. Sikaflex 221 type permanently elastic sealing compound.
5. L52 sleeve.
7. M10xL Fe/Zn5 screw.
8. 10.5 Fe/Zn5 washer.
10. PVC self-adhesive tape separator.
1. Steel hanger suspended under load-bearing structure (max every 1.5 m).
2. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
4. PVC self-adhesive tape separator.
5. Assembling foam.
6. Sikaflex 221 type permanently elastic sealing compound.
7. M10 nipple.
8. 40x40x12 steel tile with M10 threaded hole.
9. Bituminous sealing tape (e.g. SikaSeal).
10. Rod’s insulation (e.g. PE foam).
• M05/S14
  Joint between partition wall and floor.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. Sikaflex 221 type permanently elastic sealing compound.
3. Zinc-coated angle, e.g. 60x100 (optional).
4. Protection of the substrate against frost damage (acc. to architectural design of the structure).
5. Vapour barrier.
- **M05/S15**
  Joint between partition wall and roof.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. EA1B72 corner flashing.
3. ø4.8x14.6 watertight rivet (every ~300).
4. Sikaflex 221 type permanently elastic sealing compound.
5. 50x20 impregnated polyurethane sealant or assembling foam.

Detail A:
- Facing cut (cold bridge break)

Partition wall:
- Ceiling
- 15
- 15
- D
**M05/S16**
Joint between partition wall and external wall.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. EA1B72 corner flashing.
3. φ4.8x14.6 watertight rivet (every ~300).
4. Sikaflex 221 type permanently elastic sealing compound.
5. 50x20 impregnated polyurethane sealant or assembling foam.
M05/S17
Longitudinal joint between Ruukki SP2E PU panels.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. EA1B73 joint flashing.
3. EA1B74 joint flashing.
4. ø4.8x14.6 watertight rivet (every ~300).
5. Assembling foam.
6. Sikaflex 221 type permanently elastic sealing compound.
7. Bituminous sealing tape (e.g. SikaSeal).
8. ø4x10 Al/Fe white blind rivet (every ~300 mm).
**M05/S18**
Insulation of frozen warehouse wall with Ruukki SP2E PU panels.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. Anchoring sleeve of bracket screw made of austenic steel.
M05/S21
Joint between Ruukki SP2E PU panels and cold storage door – example.

1. Ruukki SP2E120PU, SP2E160PU, SP2E180PU, SP2E200PU sandwich panel.
2. Cold storage door.
3. Assembling foam.
4. Sikaflex 221 type permanently elastic sealing compound.
Our sales representatives will be happy to give you more information.

Customer Service

+48 46 858 16 00, +48 858 16 09

Ruukki Polska Sp. z o.o., Jaktorowska 13, 96-300 Żyrardów, www.ruukki.com

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