Wir zeigen Profil.

WINDOW | DOOR | CURTAIN WALL

We put a face on buildings
Wir zeigen Profil.
”We see ourselves not just as part of your solution – but as part of your team!”

Managing directors Dr. Stefan Lackner and Manfred Hebel

Ladies and Gentlemen!

You’re holding the 2019 RAICO System Overview – and thus multiple innovative solutions – in your hands. One of our latest is the RAICO THERM⁺ FS-I curtain wall system with an integrated screw channel. Thanks to its versatile design, it wins architects over straight away. And it also won GOLD in the “Product Innovation – Technology” category of the Architects’ Darling Award 2017.

The high quality of the THERM⁺ series is equalled in every respect by the RAICO FRAME⁺ Window and Door Systems, as well as our WING System. You’ll find all the product benefits plus the most important technical data, test values, models and variations listed in the following pages – as well as inspiring reference projects, ideas and solutions for ambitious architecture.

In addition to the many product highlights, you’ll certainly notice another innovation. With the RAICO added benefits, we also show our calibre as people. Whether architect, planner or partner – take a look behind the RAICO façade and find out what makes the collaboration with us so unique.

Enjoy planning, designing and discovering!

Dr. Stefan Lackner
Manfred Hebel
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Credits & Projects
RAICO IS ...

... CURIOUS AND INVENTIVE.

„Why are we always open to new things? Because we’ve always believed in the best solution.“
Curiosity enables constant further development. As a dynamic, medium-sized company, we at RAICO are inherently open to new things. Thirst for knowledge, creativity and ingenuity are an important part of our profile.

That’s why we focus on new tasks and challenges time and again. We listen with interest and attentiveness – and thus inspire ourselves and our customers to seek the best solution for everyone: real added benefits for builder-owners, architects and planners.
RAICO THINKS ... 

... IN A CONSTRUCTIVE AND SOLUTION-ORIENTED WAY.

We stock the right solution for any challenge. But we're not content to stop there. Thanks to our constructive collaboration with customers and partners, architects and planners, new systems and models are constantly being added.

Over the past 25 years, the RAICO Research & Development Team has been able to register over 100 patents and industrial property rights. From the add-on system for timber and steel façades, or the aluminium façade, window and door, to our prize-winning steel façade system. Are you looking for a very special solution, beyond the range offered in our System Overview? In that case, we’ll develop it together with you.
“Our strength lies in creating innovative solutions from ambitious remits.”
RAICO ACTS ...

... IN A SINCERE AND PERSONAL MANNER.

„We are developers, suppliers, partners and – first and foremost – people.“
Invented by RAICO. Made for people. Whatever we do at RAICO, we do it together. Because we’re team players. Because we’re reliable partners. Because we believe in a sincere and personal way of getting along together. In which people can fulfil themselves. And we can fulfil our company targets.

So it’s not just the international RAICO reference projects which have become a special architectural flagship over the years, but also the special quality of the interaction between staff and customers.
Our customers’ satisfaction over many years is still the best confirmation. It motivates us, inspires us and shows that we’re on the right path.

The premium product quality and the design potential which you can fully utilise with our systems also testify to this. Not forgetting RAICO’s exemplary development as an employer.

🔹 2017 Architects’ Darling Award, in the “Best Product Innovation – Technology” category
   GOLD for the RAICO THERM⁺ FS-I System
🔹 2017 Architects’ Darling Award, in the “Best Reference Building” category
   BRONZE for the La Seine Musicale, Paris – France
🔹 2018 Architects’ Darling Award, in the “Best Product Innovation – Technology” category
   SILVER for the RAICO ETFE_THERM⁺ system solution
🔹 TOP 100 Innovation prize – We’re therefore among the most innovative
   of Germany’s medium-sized enterprises.
🔹 EUROPE’s 500 Job Creating Companies

We are proud of these and many other awards, and likewise proud of every single one of our reference projects.
"It’s always worth getting just that bit better."
Based on its consistent modular design the THERM+ curtain wall system provides you with almost unlimited possible combinations using its various components. With this unique flexibility you will find the most suitable, safe, viable and economic solution for every individual project.
Curtain wall

The THERM⁺ aluminium curtain wall stick system combines maximum application of the range with straightforward planning and manufacture, providing high processing reliability due to the consistent modular technology.

Advantages

- Passive house certified in all system widths (A-V)
- Maximum thermal insulation with insulating block variant down to $U_{m,t} = 0.85\, \text{W/(m}^2\text{K)}$ including screw influence
- Excellent aesthetics to the flush faced transoms by sharp edge cross sections
- Profiles are all suited for mullion and transom
- Numerous options for the T-connection technology
- A large selection of rectangular and T-shaped structural profiles is available
- Wide range of system accessories available (e.g. sun protection fixation)
- Integrated drainage system in the continuous hat sealing in three levels
- Stepless thermal insulation by means of RAICO Insulating Block Technology
- Maximum inertia values by means of optimised profile design
Expansion profiles

**THERM⁺ A-I**

Maximal glazing finished pre-assembly of complete mullion-transom-elements. Easy plug-in system using half-mullion gasket for pressing to the aluminium expansion profile. Plastic cover profile for pressing to the gasket. All features as tightness, thermal insulation and easy handling and assembling identical to the basic system.

**Technical Data**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>A-I 50/56</td>
<td>25 to 200</td>
<td>75 to 200</td>
<td>50</td>
<td>4 to 64</td>
<td>up to 600</td>
<td>2 or 3</td>
<td>up to 45°</td>
<td>up to 2° inclination</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>A-V 50/56</td>
<td>25 to 200</td>
<td>100 to 200</td>
<td>50</td>
<td>10 to 64</td>
<td>up to 600</td>
<td>2 or 3</td>
<td>up to 45°</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td>A-V reinforced</td>
<td>50/56</td>
<td>100 to 200</td>
<td>–</td>
<td>–</td>
<td>10 to 64</td>
<td>up to 600</td>
<td>2 or 3</td>
<td>up to 45°</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

**T-connector — Innovation down to the last detail**

A distinctive feature of the THERM⁺ aluminium curtain wall system is the innovative T-connection technology. Every single detail in its development has been analysed to provide an abundance of advantages:

- Identical for THERM⁺ A-I/A-V in all system widths
- Easy butt joint with straight profile cuts, no notching required
- Various options for structural requirements and assembly methods
- THERM⁺ A-V is also available with a reinforcement option for high structural requirements
- T-connectors for vertical loads up to 600 kg (verified under German Type Approval)
- Also possible angular connected and polygonal
- Extremely rigid connections due to the spreader-clamp mechanism when screw fixed
- Pre-fabrication of elements suitable for transport in the workshop
- Aesthetically pleasing joints due to the optimum contact between mullion and transom across the entire profile
- The T-connector profiles can be used for structural reinforcement, head and sill fixings as well as expansion joint spigots
The THERM+ mullion-transom curtain wall system using steel combines the advantages of set-on-top construction with those offered by curtain wall systems with integrated screw channel. Additionally, the fixture technique of the steel curtain wall system makes it possible to select from standard steel profiles and the special set-on-top construction guarantees an optimum corrosion protection.

Advantages

- Passive house certified in system widths 50 and 56
- Maximum thermal insulation with insulating block variant down to $U_{\text{m,t}}=0.78 \text{ W/(m}^2\text{K)}$ including screw influence
- Stepless thermal insulation by means of RAICO Insulating Block Technology
- Set-on-top construction for any steel support profile with a width from 50 mm
- Integrated drainage system in the continuous hat sealing in three levels
- Steel profiles in T-shape with a face width of 60 mm and a depth of 60, 90, 120 mm; these profiles are ideally suited for sophisticated glass façades
- Total load chain with approved connection, from the welding with the supporting structure and the glass load transmission to the screwing of the pressure profile
- Safe and easy glass load transmission for heavy panes up to 1,500 kg
Mounting variants for base profiles

**System variants**
The THERM+ S-I offers different mounting options for basic profiles.

- 1. Welding with basic profile
- 2. HILTI-actuated fastening technology
- 3. With blind rivet
- 4. With thread-forming screw

---

**Technical Data**

<table>
<thead>
<tr>
<th>System width [mm]</th>
<th>For steel profiles from [mm]</th>
<th>Steel profiles in T shape [mm]</th>
<th>Infill thickness [mm]</th>
<th>Glass weight [kg]</th>
<th>Drainage levels</th>
<th>Polygonal assembly</th>
<th>Application glass roofs</th>
<th>Application conservatories</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-I</td>
<td>width: 50</td>
<td>width: 60, depth: 60/90/120</td>
<td>4 to 64</td>
<td>up to 1.500</td>
<td>2 or 3</td>
<td>up to 45°</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

**Perfect corrosion protection thanks to plastic base profile**

With its specific material properties, steel offers an extremely rich variety of forms and therefore a diverse range of creative possibilities. The unique patented fixture principle of the THERM+ system has been developed from real-life requirements in order to extend those possibilities further without limiting itself to glazed curtain walling, and at the same time to reach a safe but simple assembly as well as providing maximum protection against corrosion.

- Perfect protection against corrosion due to a 3 mm safety distance between structural profile and system base profile, thus no metal components in direct contact with each other (see fig. 1)
- Patented base profile system with stainless steel clad and aluminium screw channel, for easy fabrication and reliable mounting
- High screw retention values and smooth screw fastening due to the aluminium screw channel
- Option for galvanised structures in coastal areas or within swimming pool environment: the S235JR mild steel shroud with retro fit powder coated aluminium screw channel
- Spot-welding fixation for reduced production times
- Easy and efficient fabrication with practical system tools
- Mounting of the base profile with fastener, blind rivet or thread-forming screw
Thanks to the steel façade system THERM+ FS-I you can connect the pressure profile of the glass façade directly with the steel substructure – without welding. The integrated screw channel in the profile tube makes it possible.

Advantages

- Passive house certified in all system widths
- Maximum thermal insulation with insulating block variant down to $U_{\text{m,t}} = 0.75 \, \text{W/(m²K)}$ including screw influence
- Sharp edged profiles due to small radii
- Strip galvanizing of the profiles ex works
- Profiles are all suited for mullion and transom
- Integrated screw channel in tube reduces planning, manufacturing and installation costs
- Separation of screw penetration and water-bearing level by hat gaskets
- Wide range of THERM+ system accessories available e.g. sun protection fixation
- No welding needed for the curtain wall construction

Technical Data

<table>
<thead>
<tr>
<th>System width</th>
<th>For steel profiles from</th>
<th>Infill thickness</th>
<th>Glass weight</th>
<th>Drainage levels</th>
<th>Polygonal assembly</th>
<th>Application glass roofs</th>
<th>Application conservatories</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS-I</td>
<td>50/56</td>
<td>50 and 60 width</td>
<td>4 to 64</td>
<td>up to 1,000</td>
<td>up to 45°</td>
<td>up to 2° inclination</td>
<td>yes</td>
</tr>
</tbody>
</table>
T-connectors

**Standard connector SC**

- Connecting element of the mullion and transom profiles
- Variably adjustable fixing part for the tolerance compensation of the tube interior dimensions
- Smart connector concept for the tolerance compensation in the façade grid
- Threaded tube and customary steel profile on contact pressure and as twist lock screwable and stable for transport
- Suitable for the subsequent installation of the transom

**Ladder connector SCL**

- For threaded tubes and customary steel profiles
- On contact pressure screwable
- Can be used in the façade and in the roof
- Also possible angular connected and polygonal
The THERM+ timber curtain wall system provides an approved glazing technology application to structural frames made of any timber based material from 50 mm width. For a sustainable and lasting function the consistent system design assures strict separation between the structural elements and the functional components of aluminium profile and gaskets.

Advantages

- Passive house certified in system widths 50, 56 and 76
- Maximum thermal insulation with insulating block variant down to $U_{m,t} = 0.76 \text{ W/(m}^2\text{K)}$ including screw influence
- Two types of screw fixed aluminium base profiles; with or without profile locator
- Screw fixings officially endorsed by European Technical Approval, for timber product derivatives having widths of 50 mm
- Quick and easy fitting of the base profiles; also suitable for assembly with magazine fed electric screwdrivers
- No external components penetrate through to the timber frame
- Integrated drainage system in the continuous hat sealing in three levels
- Stepless thermal insulation by means of RAICO Insulating Block Technology
Variants

**Coupling mullion**
An ideal aid for efficient assembly. Pre-fabricated frames can be finished in the workshop with split coupling mullions, base profiles, interior gaskets and glass supports. On site these frames are simply coupled, glazed and finished with pressure profiles.

**Base profiles**
Suitable for all system variations. Specific gasket holding fixture for easy fixing of the silicon-free EPDM gasket. Slotted holes for integrated expansion compensation. With or without foot.

---

**Technical Data**

<table>
<thead>
<tr>
<th>System width [mm]</th>
<th>For timber profiles from [mm]</th>
<th>Infill thickness [mm]</th>
<th>Glass weight [kg]</th>
<th>Drainage levels</th>
<th>Polygonal assembly</th>
<th>Application glass roofs</th>
<th>Application conservatories</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-I 50/56/76/96</td>
<td>width: 50</td>
<td>4 to 64</td>
<td>up to 600</td>
<td>2 or 3</td>
<td>up to 45° inclination</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>H-V 50/56/76</td>
<td>width: 50</td>
<td>10 to 64</td>
<td>up to 600</td>
<td>2 or 3</td>
<td>up to 45°</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

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**The RAICO timber connector TC**

The connectors between mullion and transoms on a timber curtain wall must fulfill additional specific requirements. The dead load of the infill units is positioned in front of the timber structure, and the connectors must compensate for this torsional effect in addition to wind pressure and suction forces:

- Two patented RAICO timber connector options: SOLO and KOMBI for glass weights up to 481 kg
- For THERM H-I/H-V
- For transom depth from 60 up to 300 mm
- Minimum preparation: rebated grooves at each end of the transom and drilled holes to both the mullion and transom
- Simplified assembly: fix mullions – insert transom – secure transom with nail screws – finished
- Automatic flush position of the transom due to the integrated stop device
- Option to pre-fabricate into transportable units
- Aesthetically correct joints due to T-connector pressure across the profiles
With its consistent modular design, the THERM® system offers almost limitless combination options for the various components. In this way you can achieve the right practical and economical solution for every individual requirement.

**Transom and mullion gaskets**
- Optimised shape for maximum thermal insulation and efficient processing
- Complete covering and sealing of the base profile
- Two options of gaskets with flaps for transom and base drainage as well as draining within the continuous gasket at the structural connections
- Reliable drainage in two or three levels by simply notching
- Special accessories for all applications, e.g. transom and mullion sealing elements
- Available in EPDM or silicone materials

**Exterior gasket**
- Various exterior gaskets and insulating block options available
- Certified passive house façade
- Gradual adaptation of the insulation value
- Economic solution
- Maximum thermal insulation down to $U_{\text{ml,t}} = 0.75 \, \text{W/(m}^2\text{K)}$ including screw influence
Pressure and cover profiles for curtain wall and roof applications

- A large selection of cover profiles for all system widths
- Bespoke profiles available on a short lead time for specific projects
- Aesthetically pleasing flat pressure profile with only 4 mm glass offset
- Optimal sealing of the cross-point via special accessories
- Find more types in the THERM+ product range

![Image of various profiles]

Accessories for façade and roof applications

- Solar protection fastening
  - For all THERM+ systems of the I- and V-series

- Fixture unit
  - For all THERM+ systems in all face widths

- Fastening bracket
  - For all THERM+ systems of the I- and V-series

- Scaffolding fixation
  - For all system widths

- Canopy fastening
  - For all THERM+ aluminium systems in all face widths

- Suction disc
  - For all THERM+ systems of the I- and V-series
**PASSIVE HOUSE CURTAIN WALL**

*An energy gain for sustainable architecture*

---

The standard THERM+ system can easily be upgraded to passive house certified standard with minimal additional components. Passive house projects can therefore be fitted with energy saving glazing in a generous, cost effective way, independent of their supporting projects.

### Advantages

- Certified by the European passive house Institute Dr. Feist in Darmstadt for curtain walls and glass roofs
- Installations achieve high levels of air tightness (Blower Door Test)
- Certified with triple glazing, argon gas filling and acrylic spacer
- Specific accessories (sealing membranes and connection panel profiles) maintain integral passive house quality
- All pressure and cover profiles from the standard systems can be applied
- First passive house certified “opening element in the glass roof”

### Technical Data

<table>
<thead>
<tr>
<th>System width [mm]</th>
<th>A-V</th>
<th>S-I</th>
<th>FS-I</th>
<th>H-I</th>
<th>H-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uₘₜₜ-value in W/(m²K)</td>
<td>50/56</td>
<td>50/56</td>
<td>50/56</td>
<td>50/56/76</td>
<td>50/56/76</td>
</tr>
</tbody>
</table>

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Curtain wall
GLASS ROOF CONSTRUCTION

A bright glimpse of roofing heaven

The creation of bright, light-flooded rooms with all-spanning glass roofs is one of the central challenges of modern architecture. In order to be able to realise the most diverse designs into reality, the mullion-transom systems THERM⁺ A-I, S-I, FS-I and H-I are available for architects and planners.

Advantages

- Tested with an inclination of only 2°, with outstanding results and classifications (Accessories such as sun protection devices and building connection components were included in the testing.)
- The system structure is identical to the THERM⁺ standard systems
- Outlets at the end of the pressure profiles provide efficient drainage and avoid stagnant water
- The low pitch construction is made feasible with bevelled pressure profiles, flat pressure profiles, silicone joints or any combination of these
- Natural and smoke ventilation can be achieved by inserting our aesthetically pleasing WING 105 DI and FRAME⁺ 100/120 RI opening roof-lights which have also been tested down to 2° from horizontal

Curtain wall
STRUCTURAL GLAZING SG

A slimline look with hefty insulation values

The THERM+ Structural Glazing SG2 curtain wall systems feature the most intricate glazing technique. A narrow silicone joint is the only visible line between the insulation glass panes. Retention of the internal pane is enabled easily, quickly and securely with the use of SG glazing toggles. By utilising the SG insulating block, curtain walls achieve outstanding thermal insulation values.

Advantages

- Can be combined with any of our other system variations, with any pressure profiles and also with suction discs
- For double or triple glazing, from 32 to 64 mm thickness
- Efficient and safe glass fixation with structural glazing toggles
- High thermal insulation down to $U_{\text{m,t}} = 0.90 \text{ W/(m}^2\text{K)}$ (including screw influence)
- Available in 50 and 56 mm versions of all THERM+ systems
- Application in glass curtain wall and glass roof possible
The design of fire protection curtain wall is identical to the standard systems, thus requiring a minimum of additional cost and fabrication effort. No visual difference between the variations. All standard structural profiles can be applied. Application of standard gaskets. Only a few additional components necessary. Maximum freedom of design with storey height screens.

### Technical Data

<table>
<thead>
<tr>
<th>System width 50/56 mm</th>
<th>Fire resistance class</th>
<th>Max. glass formats</th>
<th>General approval</th>
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<tbody>
<tr>
<td>A-V</td>
<td>structural profiles from 50 mm</td>
<td>EI30</td>
<td>1,400 x 3,000 mm</td>
</tr>
<tr>
<td>S-I</td>
<td>structural profiles from 60 mm</td>
<td>EI30</td>
<td>1,500 x 3,000 mm</td>
</tr>
<tr>
<td>FS-I</td>
<td>structural profiles from 60 mm</td>
<td>EI30</td>
<td>1,500 x 3,000 mm</td>
</tr>
<tr>
<td>H-I</td>
<td>structural profiles from 60 mm</td>
<td>F30/G30</td>
<td>1,500 x 3,000 mm</td>
</tr>
<tr>
<td>H-I</td>
<td>structural profiles from 60 mm</td>
<td>EI30</td>
<td>1,920 x 3,000 mm</td>
</tr>
</tbody>
</table>

### Technology in detail

- Aluminium glass carrier
- Short length stainless steel reinforcement to pressure plate
- Fire protection block (intumescent strip in glazing rebate)
BURGLAR RESISTANCE

No one can get past these solutions

All THERM+ curtain wall variants may be made burglar resistant in accordance with the German resistance categories RC2 and RC3 by adding a few supplementary system components. Providing maximum creative possibilities, all system widths and all types of pressure plates with clip on cover caps, visible screw fixings, as well as flat pressure profile plates (in RC2) may be used.

Advantages

- Extension of the standard systems by using additional shims with pressure-resistant backing and captivated ball bearing screw heads
- For RC3 supplementary reinforcement to the pressure profile, captivated ball bearing screw heads, reduced screw spacing
- No visual difference between the variations
- Wide selection of pressure and cover profiles
- System width and infill thickness as for standard systems
- Manufacture is identical to the standard system, thus production and assembly is rationalised to the standard system
- The production of glass roofs in class RC2 and RC3 is also available
- The following insertion elements can be applied: Aluminium window system FRAME+ (from page 33) Aluminium door system FRAME+ (from page 51) Aluminium window system WING (from page 61)
## Approvals / Certification / CE-labelling

based on product standard for curtain walling EN 13830

<table>
<thead>
<tr>
<th>Thermal insulation incl. screw influence</th>
<th>THERM⁺ A-I</th>
<th>THERM⁺ A-V</th>
<th>THERM⁺ S-I</th>
<th>THERM⁺ FS-I</th>
<th>THERM⁺ H-I</th>
<th>THERM⁺ H-V</th>
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<tr>
<td>down to $U_{m2} = 0.85$ W/(m²K)</td>
<td>down to $U_{m2} = 0.89$ W/(m²K)</td>
<td>down to $U_{m2} = 0.78$ W/(m²K)</td>
<td>down to $U_{m2} = 0.75$ W/(m²K)</td>
<td>down to $U_{m2} = 0.77$ W/(m²K)</td>
<td>down to $U_{m2} = 0.80$ W/(m²K)</td>
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<td>1.875 / 2.813 kN/m²</td>
<td>1.875 / 2.813 kN/m²</td>
<td>2.5 / 3.75 kN/m²</td>
<td>2.5 / 3.75 kN/m²</td>
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<td>Resistance against impact</td>
<td>interior I5, exterior E5</td>
<td>interior I5, exterior E5</td>
<td>–</td>
<td>–</td>
<td>interior I5, exterior E5</td>
<td>interior I5, exterior E5</td>
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<td>Air permeability</td>
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<td>AE (&gt; 600)</td>
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<td>Water tightness</td>
<td>RE 1,650</td>
<td>RE 1,650</td>
<td>RE 1,950</td>
<td>RE 1,950</td>
<td>RE 2,100</td>
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<td>Airborne sound insulation</td>
<td>$R_w (C; Ctr) = 35$ (–1; –3) dB</td>
<td>$R_w (C; Ctr) = 36$ (–1; –4) dB</td>
<td>$R_w (C; Ctr) = 42$ (–2; –6) dB</td>
<td>$R_w (C; Ctr) = 47$ (–1; –6) dB</td>
<td>$R_w (C; Ctr) = 34$ (–1; –4) dB</td>
<td>$R_w (C; Ctr) = 36$ (–1; –4) dB</td>
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<tr>
<td>Fall protection (TRAV)</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| German general approval | curtain wall system Z-14.4-454 T-connector Z-14.4-461 | curtain wall system Z-14.4-504 T-connector Z-14.4-461 | curtain wall system Z-14.4-446 | – | curtain wall system Z-14.4-455 | curtain wall system Z-14.4-516 |
| European Technical Approval | – | – | ETA-19/0564 | ETA-19/0554 | ETA-13/0765 | ETA-13/0765 |
| Fire resistance | – | E30 | E30 / EW30 / Ei30 | E30 / EW30 / Ei30 | F30 / G30 / Ei30 | E30 / EW30 / Ei30 |

### Product standard for curtain walling EN 13830:

**Features and classification for CE-Labelling**
(tested with an inclination of 2°)

<table>
<thead>
<tr>
<th>Test type/Standard</th>
<th>THERM⁺ A-I</th>
<th>THERM⁺ S-I</th>
<th>THERM⁺ FS-I</th>
<th>THERM⁺ H-I</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4.1 wind resistance</td>
<td>wind pressure up to 2.6 kN/m²</td>
<td>wind suction up to 2.7 kN/m²</td>
<td>wind pressure up to 2.6 kN/m²</td>
<td>wind suction up to 2.7 kN/m²</td>
</tr>
<tr>
<td>No. 4.4 air permeability</td>
<td>class AE (2,100)</td>
<td>class AE (2,100)</td>
<td>class AE (2,100)</td>
<td>class AE (2,100)</td>
</tr>
<tr>
<td>No. 4.5 water penetration</td>
<td>up to class RE 2,550¹</td>
<td>up to class RE 2,550¹</td>
<td>up to class RE 2,550¹</td>
<td>up to class RE 2,550¹</td>
</tr>
</tbody>
</table>

¹ Test deviating from EN 12155 with a water quantity of 3.4 l/(m² min). The standard specifies a water quantity of 2 l/(m² min).
Wir zeigen Profil.

Test tower Thyssenkrupp – Rottweil, DE
With the award-winning FRAME⁺ aluminium window system, RAICO meets architectural demands whilst setting benchmarks in the industry for thermal performance requirements. FRAME⁺ offers a convenient range of thermal performance levels for opening lights, fixed glazing and roof-lights where thermal transfer coefficients of $U_f = 0.79 \text{ W/(m}^2\text{K)}$ are possible.
The innovative FRAME+ system concept with its modular composition: The system profiles consist of identical interior and exterior aluminium extrusions and can be adapted to the required depth and thermal insulation by selection of the THERMORIT insulation bars.

Advantages

- Maximum energy savings with variable adjustment of the insulation values down to $U_i = 0.81 \text{ W/(m}^2\text{K)}$
- System depth 75 mm
- Stepless thermal insulation
- Innovative system components, such as THERMORIT insulation bars featuring distinctly reduced heat transmission values
- Integration of efficient insulation areas
- A range of opening options is available
- Consistent thermal optimization of the modular system
- Concealed fitting up to 150/180 kg
- Available as system for self-fabrication or as pre-assembled units
FRAME+ 75 SF

Insert window

FRAME+ with filigree slim design: With the FRAME+ 75 SF we offer you a window system with extremely slim visual appearance. The face width of the exterior view of the sash of only 23 millimetres enables the realization of timelessly elegant architecture with exclusive detailing.

Advantages

- Extremely slim exterior view of the sash with a face width of only 23 mm
- Increased airtightness and cleaning-friendly execution without visible glazing beads in the sash
- Mitred cut exterior glazing bead with stabilising corner plate
- Maximum thermal insulation with $U_{1}$-values down to 1.1 W/(m²K)
- All sashes are executable in two colours without elaborate half-shell coating
- Application of all outer frames of the proven FRAME+ 75 WI
- Optionally with overlapping and concealed fitting
- Similarly executable also as FRAME+ 90 SF

Office building - Karlsruhe, DE

FRAME+ 75 SF outer frame with sash and triple glazing
Using FRAME+ 75 WB as a concealed sash window offers very filigree elevation widths, not showing any visible window bars. This version is also available as a floating window, with overlapping casement, and with decorative glazing bars. For built-in punched opening windows, the opening elements and window elements have an identical face width.

**Advantages**

- High-insulation windows with $U_r = 1.1 \text{W/(m}^2\text{K)}$
- System depth 75 mm
- Application as window for punched openings or, with outer frame extension, for integration into curtain wall
- No visible glazing beads
- Very slim visual appearance
- Available as a dummy mullion sash
The version FRAME⁺ 75 FF offers additional advantages of this trendsetting window technology, such as a slim-line mullion-transom design model featuring elevation widths of only 50 mm.

**Advantages**

- Window curtain wall system with stick system appearance and an external face width of only 50 mm
- System depth 75 mm
- Ideal for economic ribbon windows up to storey height
- High-insulation windows with Uₜ down to 0.98 W/(m²K)
- Slim curtain wall appearance with sashes or fixed glazing
- Comprehensive diversity of design with various cover profiles from the THERM⁺ curtain wall system
- Available as a dummy mullion sash

*Material Arts – Frankfurt, DE*
The FRAME+ 75 WA version offers several usage as bottom-hung, top-hung, side-hung, top-hung projecting all outward openings.

**Advantages**

- High-insulation windows with U<sub>f</sub>, down to 1.4 W/(m<sup>2</sup>·K)
- System depth 75 mm
- Narrow face widths with the casement sash design, no visible glass retaining strips
- Opening options: bottom-hung, top-hung, side-hung, top-hung projecting
- Internal or external glazing options
- Available with curtain wall adapter outer frame profile
With its choice of space saving opening methods (slide to step through / tilt to provide ventilation) coupled with its outstanding thermal performance and its very high air tightness qualities, the parallel tilt and slide door is ideally suited for use as a terrace or balcony door.

**Advantages**

- Outstanding insulating properties
- Innovative, space-saving runner technology
- Large openings up to a sash width of 2 m
- High sash weights up to 200 kg
- For sash weights over 150 kg, hardware assisted operation for ease of use
- Excellent ventilating properties using a storm proof tilting position
- Highly impermeable by circumferential medial gasket technology
- Broad range of applications for extensive terrace and balcony openings in the private and commercial buildings
- Various ways of opening:
  - space-saving due to slide position
  - long-term ventilation in tilt position
The threshold belongs to the most sensitive parts of French doors. Especially in the threshold area thermal insulation and air tightness is a real challenge. With our new barrier-free threshold we are offering a product that meets all requirements on modern and safe construction ergonomics.

Advantages

- The thermally separated aluminium sill is possible for barrier-free threshold acc. to DIN 18040 with a maximum height of 20 mm
- Increased air-tightness due to unique, horizontal additional locking, making larger sash widths possible
- Visually attractive solution by small face widths
- Standard fittings applicable as surface mounted or concealed option for an attractive appearance
- Application as window for punched openings or, with outer frame extension, for integration into curtain wall

- Substructure of sill with standard enlargement of FRAME+ series
- Opening options: One-leaf: turn and turn-tilt Double-leaf: turn-tilt/turn and turn/turn
- Maximum sash dimensions of 1,100 x 2,500 mm / 1,450 x 2,200 mm
- Available as system for self-fabrication or as pre-assembled units
- Tested Uₐ-values 75 WI: 1.8 W/(m²K) 90 WI: 1.4 W/(m²K)
Completing the FRAME+ product series, two ventilation flaps are available for the curtain wall system THERM+ (elevation width of 200 mm) and the aluminium window system FRAME+ (elevation width of 300 mm). The ventilation flap gives an extraordinary impression regarding a façade’s design, due to its characteristic narrow elevation width.

**Advantages**

- Storey height ventilation with a single thermally broken profile without the need for a frame or glazing beads
- Inside and outside homogeneous, flat surface
- Burglar resistant
- U-values down to $U_{\text{eq}} = 0.86 \text{ W/(m}^2\text{K)}$
- Impact resistant fixed opening width of 120 mm (for FRAME+ 75 LF 200)
- With outer frame profile also possible for integration into curtain wall
- Available as system for self-fabrication or as pre-assembled units
The automatic ventilation flap FRAME⁺ 75 LF-WG has invisible integrated motor technology and a special outer frame design, enabling the incorporation of an insect protection or perforated sheet metal plate. It ensures the optimal ventilation and aeration of conservatories and other buildings.

Advantages

- By the fixed opening width of 120 mm without further action in the open condition, the flap is burglar and impact-proof
- The motor drive is perfectly integrated under the continuous center gasket, invisible in the fixed frame
- Available as system for self-fabrication or as pre-assembled units
- By running a highly insulated composite airfoil without frame and glazing beads and both sides homogeneous planar surfaces results in a particularly inconspicuous design
- Integrable inconspicuous insect protection with a 80 % open area ventilation
The solution’s outstanding energy efficiency was one of the reasons for the FRAME+ 90 WI aluminum window system being awarded the “Component Award 2014”. Additionally it is exceptionally economical and maximizes overall savings at the level of both investment and energy costs compared to standard windows.

Advantages

- Outstanding thermal insulation with a volume fraction of 60 % of the innovative material used for THERMORIT bars: $U_w = 0.75 \text{ W/(m}^2\text{K)}$ | $U_f$-value = 0.79 W/(m²K)
- Maximum thermal insulation and glass infill thicknesses up to 80 mm (in the sash)
- High performance thermal insulation insert with a depth of 60 mm
- Available as system for self-fabrication or as pre-assembled units
- Simplified, more flexible installation into curtain wall with range of variable system components
- Opening variants: Turn-tilt/Turn/Tilt-turn (tilt first)/Tilt/Parallel tilt and slide door
- Clean and easy corner cleat bonding using innovative adhesive injection method into synthetic distribution channel
- Suitable for composite coating and anodising
Using FRAME⁺ 90 WB as a concealed sash window offers very filigree elevation widths, not showing any visible window bars. This version is also available as a floating window, with overlapping casement, and with decorative glazing bars.

Advantages

- Outstanding thermal insulation with a volume fraction of 60% of the innovative material used for THERMORIT bars: $U_w = 0.76 \text{ W/(m}^2\text{K)}$ | $U_f$-value $\geq 0.89 \text{ W/(m}^2\text{K)}$
- Safe glazing technology in conformity with the standards offering large ventilation spaces and an exterior gasket frame with corner vulcanisation
- Individual design options for the interior outer frame profile by using colour adaptable cover profiles
- Insulation of the glazing rebate by glazing rebate insulating block with large ventilation spaces and insulation of the hollow profile sections by high thermal insulating insertions
- Fitting variants:
  - Concealed fitting, thereby invisible parts, low-maintenance
  - Surface-mounted fitting with enhanced version of the standard corner bearing enables higher sash weights and increased stability
In the new RAICO aluminium timber window FRAME+ 90 WB-T, a warm living ambience meets the most modern composite technology made of highly thermally insulating THERMORIT. Enjoy cosiness in the interior area provided by the use of wood, and classical functionality due to weatherproof aluminium on the outside.

Advantages

- Aluminium timber window with identical processing technology of standard aluminium windows
- Outstanding thermal insulation with a volume fraction of 60% of the innovative material used for THERMORIT bars: $U_w = 0.77 \text{ W/(m}^2\text{K)}$ | $U_I$-value $= 0.89 \text{ W/(m}^2\text{K)}$
- Real wood cladding on the inside as a decorative element, perfectly suited to the optical appearance of the curtain wall. Wide range of different types of wood
- Individual design options for the interior outer frame profile by using colour adaptable cover profiles
- Integral sash made of dimensionally stable aluminium-THERMORIT composite construction without considering the interior timber frame, therefore exchangeable at any time
- Real wood cladding on the inside with simple screw connection technique on production or construction site, exchangeable after installation
- Compensation of glass infill thickness by special clip gaskets
- Opening variants: Tilt and turn/turn/tilt before turn/tilt
- Available as system for self-fabrication or as pre-assembled units

West Buckland School – Devon, UK
With its new FRAME+ 100/120 RI rooflight window, RAICO is once again opening up a range of new possibilities in the field of functional and aesthetic roof design – thanks to their special depth of section, passive house certification and lean, elegant appearance which perfectly matches the proven THERM+ roof and curtain wall systems.

Advantages

- Innovative insulating bar material THERMORIT with very low thermal conductivity and suitable for composite coating and anodising
- Stepped glass variant optionally available either in unilateral design or with circumferential full glass finish with identical outer and sash frame
- Various glass step variants available for a circumferential glass step (F-strip, suction disc)
- Two different glazing variants due to the option for the screw connection of the cover profile (visible or concealed)
- Tested with a roof inclination of up to 2° it forms the perfect complement to the THERM+ glass roof systems
- High burglar resistance (RC2) due to concealed turning hinges
- Maximum airflow effect due to an opening angle of up to 90°; Tested for natural ventilation as well as a smoke and heat exhaust ventilator acc. to DIN EN 12101-2
- Various opening possibilities due to mounting options on all four sides, manual or with motor drive; wide selection of linear or chain drives
- Opening variants: Turn, Tilt, Top-hung
- First passive house certified „opening element in the glass roof“
- Available as system for self-fabrication or as pre-assembled units
The interior real wood cladding turns the \textit{FRAME\textsuperscript{+} 100/120 RI-T} into a design highlight that is ideally integrated in the \textit{THERM\textsuperscript{+} H-I/H-V} timber curtain wall system.

\textbf{Advantages}

- Aluminium timber window with identical processing technology of standard aluminium windows
- Outstanding thermal insulation with a volume fraction of 60\% of the innovative material used for \textit{THERMORIT} bars: $U_f$-value = 1.4 W/(m\textsuperscript{2}K)
- Real wood cladding on the inside as a decorative element, perfectly suited to the optical appearance of the curtain wall; wide range of different types of wood
- Real wood cladding on the inside with simple screw connection technique on production or construction site, exchangeable after installation
- Integral sash made of dimensionally stable aluminium-\textit{THERMORIT} composite construction without considering the interior timber frame, therefore exchangeable at any time
- Compensation of glass infill thickness by special clip gaskets
- Tested with a roof inclination of up to 2\° it forms the perfect complement to the \textit{THERM\textsuperscript{+}} glass roof systems
- Tested for natural ventilation as well as a smoke and heat exhaust ventilator
- High degree of tightness by three peripheral seal levels with medial gasket frame
- Available as system for self-fabrication or as pre-assembled units
Quality in detail

The FRAME+ window series also guarantees a high degree of design freedom, in addition to a high energy saving thanks to maximized thermal insulation. The following table shows the achieved values and possible applications of the different systems.

<table>
<thead>
<tr>
<th>System values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U</strong>&lt;sub&gt;c&lt;/sub&gt;-value ¹ passive house in W/(m²K)</td>
</tr>
<tr>
<td><strong>U</strong>&lt;sub&gt;f&lt;/sub&gt;-value ² in W/(m²K)</td>
</tr>
<tr>
<td>System depth (mm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punched opening window</td>
</tr>
<tr>
<td>Curtain wall insertion element</td>
</tr>
<tr>
<td>Casement sash</td>
</tr>
<tr>
<td>Window curtain wall</td>
</tr>
<tr>
<td>Opening element in the glass roof</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application limits ³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. weight concealed fitting (kg)</td>
</tr>
<tr>
<td>Max. sash dimensions (mm) ⁴</td>
</tr>
<tr>
<td>Infill thickness sash (mm)</td>
</tr>
<tr>
<td>Infill thickness fixed glazing (mm)</td>
</tr>
</tbody>
</table>

1 Determined with glass \( U_g = 0.7 \) W/(m²K)
2 Thermal insulation based on DIN ISO 10077-2
3 Applications outside these limits, would be subject to an assessment by our Technical Department
4 For authorized sash sizes, see fitting diagram in the relevant planning documents
* 130 / 160 kg with standard fitting up to 200 / 300 kg with reinforced fitting
Tests

The FRAME® window system has undergone rigorous testing according to the product standard for windows and exterior doors EN 14351.1 and achieved the following classification. These values are at the same time the base for simplified CE marking of windows.

<table>
<thead>
<tr>
<th>FRAME+ 75 Wi Insert window</th>
<th>FRAME+ 75 SF Insert window</th>
<th>FRAME+ 75 WB Casement sash window</th>
<th>FRAME+ 75 FF Window curtain wall</th>
<th>FRAME+ 75 WA Outward opening</th>
<th>FRAME+ 90 Wi Casement sash window</th>
<th>FRAME+ 90 WB-T Al. timber window</th>
<th>FRAME+ 100/120 RI Timber rooflight window</th>
<th>FRAME+ 100/120 RI-T Timber rooflight window</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air permeability</strong> ¹</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
</tr>
<tr>
<td><strong>Resistance to wind load</strong></td>
<td>up to class C5</td>
<td>class C5</td>
<td>up to class C5</td>
<td>class C5</td>
<td>up to class C5</td>
<td>up to class C5</td>
<td>up to class C5</td>
<td>class C3/C4 *</td>
</tr>
<tr>
<td><strong>Resistance against impact</strong></td>
<td>class 5</td>
<td>–</td>
<td>class 3</td>
<td>class 3</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Water tightness</strong> ¹</td>
<td>up to E 900</td>
<td>up to E 750</td>
<td>up to E 900</td>
<td>up to E 900</td>
<td>up to E 1200</td>
<td>up to E 1200</td>
<td>up to E 900</td>
<td>up to E 1500</td>
</tr>
<tr>
<td><strong>Operating forces</strong> ¹</td>
<td>class 1 and 2</td>
<td>class 1</td>
<td>class 1</td>
<td>class 1 and 2</td>
<td>class 1</td>
<td>class 1</td>
<td>class 1</td>
<td>–</td>
</tr>
<tr>
<td><strong>Airborne sound insulation</strong>²</td>
<td>$R_{w} (C; C_{tr})$ up to 45 dB</td>
<td>$R_{w} (C; C_{tr})$ up to 46 dB</td>
<td>$R_{w} (C; C_{tr})$ up to 42 dB</td>
<td>–</td>
<td>$R_{w} (C; C_{tr})$ up to 43 dB</td>
<td>–</td>
<td>$R_{w} (C; C_{tr})$ up to 43 dB</td>
<td>$R_{w} (C; C_{tr})$ up to 43 dB</td>
</tr>
<tr>
<td><strong>Mechanical strength</strong> ¹</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
<td>–</td>
</tr>
<tr>
<td><strong>Burglar resistance</strong></td>
<td>class RC2/RC3</td>
<td>–</td>
<td>class RC2/RC3</td>
<td>–</td>
<td>class RC2/RC3</td>
<td>class RC2/RC3</td>
<td>class RC2</td>
<td>class RC2</td>
</tr>
<tr>
<td><strong>Continuous-operational testing EN 12400</strong></td>
<td>class 2</td>
<td>class 2</td>
<td>class 2</td>
<td>class 2</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>class 3</td>
</tr>
</tbody>
</table>

¹ Tested to RAL GZ 695
² The values are referred to the standard size of 1.23 x 1.48 m
* Values are maximum tested/max. classification

The classification must be realized according to the requirements of the specifications.
Primary school - Neubiberg, DE
The FRAME+ door system is based on the well proven concept of the FRAME+ window series. The door profiles are designed to match the window profiles. In addition, many products from the window range are compatible with the door system. When used as an insert element, the door series can be integrated perfectly into the tried and tested THERM+ passive house curtain wall system.
FRAME+ 75 DI

Aluminium door

FRAME+ 75 DI fulfils all the requirements for a high quality entrance door. Special profile contours enable simple installation. The series is characterised by short production times and efficient manufacturing. Smooth rebate geometries enable fast installation of all types of hardware in the rebate. Large internal chambers within the profiles provide acceptance of all fittings, such as electrical door release mechanisms.

Advantages

- Featuring $U_D$-values down to 0.69 W/(m²K) to meet passive house standards
- Buildings, curtain wall and residential project installations
- Extensive design options within the series
- Standard fittings
- Ease of manufacture with innovative features
- Sturdy composite profiles ensuring long-lasting functionality
- Inward and outward opening single doors
- Inward and outward opening double doors
- Leaf-enclosing doors on one side, inward/outward opening
- Leaf-enclosing doors on both sides, inward opening
- Tested to EN 12208 for water tightness:
  - Inward opening door to Class 9A (600 Pa)
  - Outward opening door to Class 8A (450 Pa)
- Integral sidelights and fanlights
- Outward opening escape doors to EN 179 / 1125

3D Concept

- High degree of tightness due to innovative sealing concept
- Improved insulation of down to $U_f = 1.4$ W/(m²K)
- Large dimensions, up to 3.0 m height

Selection of door combinations
Individuality and appearance are of high importance when considering the design of entrance doors, to enable symbiosis with the building. The FRAME+ door system offers creative options through the large range of profiles that can be perfectly combined with decorative door panels.

Aluminium front doors with an individual design

Three different design versions offer a wide range of individual design options. Nearly any design – from an expressive linear composition to soft flowing shapes – can be created with the FRAME+ door system.

- Three different design types:
  - Basic Style – lineal profile
  - Modern Style – softer edges with curved contours
  - Classic Style – distinguished lines with bevelled contours
- Optional grey gaskets to minimise optical contrasts
- All design variations are compatible in any combination
The threshold is one of the most vulnerable parts of an entrance door. In particular, the threshold requires high levels of weather tightness and thermal performance. RAICO has chosen a totally new path to address these problems, and has developed a completely new threshold concept, resulting in an even higher level of impermeability.

**Innovative threshold concept**

The door threshold needs to ensure perfect weather tightness. With its excellent insulation within the threshold area, reliable protection against driving rain and draught is guaranteed, reducing expensive heat losses. The low profile ensures comfortable barrier free access.

- Highest degree of weather tightness
- Excellent insulation to threshold areas, down to $U_f 1.6 \text{ W/(m}^2\text{K)}$
- Retro fit exchangeable threshold connector – easy assembly
- Thermally separate aluminium threshold with replaceable gasket
- Threshold base structure options
Hinges

Here, the whole focus is on function and design

Door hinge requirements are highly complex – from both functional and aesthetic perspectives. The FRAME+ 75 DI door system fittings fulfil these requirements perfectly. For example, they offer a variety of setting options and can accommodate heavy sash weights as well as provide aesthetically pleasing stainless steel finishes.

**Face fixed flag hinges**
- Intricate shapes through optimised dimensions
- Inward and outward opening options
- Anchor screw or mounting plate fixings
- Large colour range in aluminium or stainless steel finish
- Two and three part hinge options
- Post installation three way adjustment without unhinging the sash
- Maximum weight of 200 kg

**Roller Hinge**
- Inward or outward opening profile adapted hinges
- Direct screw fixing to outer frame without hinge plates
- Sash fixing utilises a multifunctional hinge body with integral adjustment
- Large colour range in aluminium or stainless steel finish
- Generous post installation multi-directional adjustment without unhinging the sash (Rebate adjustment ± 2 mm, height adjustment ± 3 mm)
- Efficient production utilising pre-assembled hinge parts
- Material optimisation in the 7 mm rebate enables a very high load capacity up to 250 kg
- Integrated visual control of hinge adjustment on the sash hinge body
- Stainless steel option with high load bearing capacity up to 250 kg
- Air permeability test to class 3

Screw-on hinge, three parts, with fixation, inward opening
Roller hinge with fixation inward opening
Aluminium roller hinge outward opening
FRAME+ profiles have been designed to accommodate open market standard fittings. Smooth rebate construction enables fast and easy installation of a wide range of products (i.e. concealed door locks). Using a standard milling template for all lock types provides optimised fabrication as well as offering simple replacement or change of use options. A large range of accessories caters for individual customer requirements.

**Standard lock for inward or outward opening doors**
- Standardised profile processing for locks and strike plates
- Latch lock/dead locks
- Multi-point locking system with shoot or hook bolts
- Automatic locking with or without electrical release mechanism

**Emergency exit/panic lock in accordance with EN 179/1125**
- Emergency exit and panic doors
- Tested in accordance with EN 179/1125 for ability to release
- Latch lock / dead locks with shift function E
- Latch lock / dead locks with changeover function B
- Single and multi point locking
- Integral electrical release and monitor options
- Automatic locking to the slave leaf of a pair of doors with full or partial escape mechanism
Feel secure by night and day. With innovative technology, the RAICO door system can be individually equipped with burglar resistant components to suit your security requirements. With analogue installation options in all design variations, you don’t have to forgo any creative freedom.

**BURGLAR RESISTANCE**

*Better safe than sorry*

Just by adding a few supplementary system components the RAICO door system can be equipped with burglar resistant properties in resistance classes RC1, RC2 and RC3. Maximum creative freedom is enabled via analogue installation options with Modern Style and Classic Style design variants.

**Optimum safety based on the latest Know-How**

- **RC1N** – Standard glass additional blocking
- **RC2N** – Standard glass additional blocking + bonding
- **RC2** – Special glass additional blocking + bonding
- **RC3** – Special glass, rebate reinforcement; additional blocking + circular bonding
Thermal insulation for door system FRAME+ 75 DI

Individual thermal insulation

- Incremental adjustment of insulation values – to meet the project specific requirements

- Featuring $U_D$ values down to 0.69 W/(m²K) for use in passive-houses

<table>
<thead>
<tr>
<th>Without insulation insertion down to $U_f$</th>
<th>With insulation insertion down to $U_f$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard W/(m²K)</strong></td>
<td><strong>Leaf-enclosing W/(m²K)</strong></td>
</tr>
<tr>
<td>Inward</td>
<td>Outward</td>
</tr>
<tr>
<td>Without insulating block rebates</td>
<td>2.0</td>
</tr>
<tr>
<td>Insulating block glazing rebate</td>
<td>2.0</td>
</tr>
<tr>
<td>Insulating block frame rebate and sash rebate</td>
<td>1.9</td>
</tr>
<tr>
<td>Insulating block frame rebate and sash rebate and glazing rebate</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Approvals

The FRAME® door system has undergone rigorous testing according to the product standard for windows and exterior doors and achieved the following classifications. These values (regarding to EN 14351-1) are at the same time the base for simplified CE marking of windows.

<table>
<thead>
<tr>
<th>Inward opening</th>
<th>Outward opening</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single sash</strong></td>
<td><strong>Double sash</strong></td>
</tr>
<tr>
<td>Air permeability / EN 14351-1</td>
<td>class 4</td>
</tr>
<tr>
<td>Resistance to wind load EN 12210</td>
<td>class C4</td>
</tr>
<tr>
<td>Water penetration / EN 12208</td>
<td>class 9A</td>
</tr>
<tr>
<td>Operating forces / EN 12217</td>
<td>class 2</td>
</tr>
<tr>
<td>Burglar resistance / EN 1627</td>
<td>class RC3</td>
</tr>
<tr>
<td>Sound insulation / EN ISO 717-1</td>
<td>$R_w(C;C_{tr})$ up to 44 dB</td>
</tr>
</tbody>
</table>

* Value is referred to the execution with roller hinge.

### FRAME® 75 DI
Aluminium door

<table>
<thead>
<tr>
<th>System values</th>
</tr>
</thead>
<tbody>
<tr>
<td>System depth [mm]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punched opening window</td>
</tr>
<tr>
<td>Curtain wall insertion element</td>
</tr>
<tr>
<td>Leaf-enclosing infills</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. width active leaf</td>
</tr>
<tr>
<td>Min. width inactive leaf</td>
</tr>
<tr>
<td>Min. height active/inactive leaf</td>
</tr>
<tr>
<td>Max. width active/inactive leaf</td>
</tr>
<tr>
<td>Max. height active/inactive leaf</td>
</tr>
<tr>
<td>Max. sash weight</td>
</tr>
<tr>
<td>Glass infill thickness sash</td>
</tr>
<tr>
<td>Glass infill thickness frame</td>
</tr>
<tr>
<td>Leaf-enclosing infill thickness</td>
</tr>
</tbody>
</table>

1. For a clear passage width ≥ 800 mm with 90° opening min. width = 940 mm
2. At EN 179 / EN 1125 as well as standard with closing sequence control min. width = 450 mm
3. For a clear passage width ≥ 1,800 mm with interlocking catch lock min. height = 1,821 mm
4. At multipoint locking with pusher height 1,050 mm
5. Depending on the hinge equipment, see diagram 6000 in the planning manual “FRAME® 75 DI fittings”. More specific requirements (oversized dimensions) on request.
6. Depending on profile, see selection tables glazing beads in the planning manual “FRAME® 75 DI fittings”.

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Door
The WING window system provides you a comprehensive range of window types which allows you to make the best choice for every individual application. All WING window variants meet the aesthetic requirements of modern architecture and thus become a creative element for your façade design.
Thanks to its narrow sight line widths and patented concealed fittings, the WING 50 A window meets the requirements of modern architecture for natural ventilation as well as a smoke exhaust ventilator.

Advantages

- Outward opening window in its most attractive design with stepped edge glazing
- Economic alternative with standard glass and slim profile design
- Maximum airflow effect due to an opening angle of 60°
- Ideal for very large sash formats
- Concealed hinges, mountable on any side
- No visible screws or glazing strips
- Advantages in production and logistics due to SG bonding of WING 50 A-S with split sash frame
- Various motor drives
- Available as system for self-fabrication or as pre-assembled units
- Available for natural ventilation as well as a smoke and heat exhaust ventilator in large sash sizes up to 5.2 m²

Variants: WING 50 A

- Variant 1: WING 50 A-R with standard sealed units and low profile sash frame without glazing beads – the cost saving alternative
- Variant 2: WING 50 A-S with stepped edge glazing and static adhesion
The innovative glazing technology of WING 50 SK features the option of a glass surface on the outside using structurally bonded stepped edge glazing, or a low profile frame with standard sealed units.

Advantages

- Outward opening projecting window with stepped edge glazing
- Economic alternative with standard glass and slim profile design
- For large sashes up to 150 kg
- No visible screws or glazing beads
- Very slim design: inside 52 mm, outside 50 mm

- Various motor drives and handles available
- Available as system for self-fabrication or as pre-assembled units
- Advantages in production and logistics due to SG bonding of WING 50 SK-S with split sash frame
- Available for natural ventilation as well as a smoke and heat exhaust ventilator in large sash sizes up to 3.5 m²

Variants: WING 50 SK

- Variant 1: WING 50 SK-R with standard sealed units and low profile sash frame without glazing beads or visible screws
- Variant 2: WING 50 SK-S with stepped edge glazing

Variant 1: WING 50 SK-R

standard glass

Variant 2: WING 50 SK-S

stepped edge glazing and static adhesion
With its low profile height, its large sash dimensions and its specific sealing technique, the WING 105 DI skylight is the perfect solution for almost any application with an inclination down to 2° from horizontal.

**Advantages**

- Two-frame sash design without any visible screws or glazing beads on the outside
- Reliable drainage due to a special profile design and triple sealing system for safe water tightness
- Completely concealed hinges, mountable on any side
- Infill thickness 9 to 48 mm
- Maximum airflow effect due to an opening angle of 65° (90° available)
- Available for natural ventilation as well as a smoke and heat exhaust ventilator in large sash sizes up to 4.0 m²
- Designed to complement the THERM+ glass roof systems, even down to 2° inclination
- Only 37 mm of glass offset between the glass roof and the rooflight window
- Available as system for self-fabrication or as pre-assembled units

**Variants: WING 105 DI**

- **Variant 1**: Standard with twofold glazing
- **Variant 2**: High thermal insulation with threefold glazing and insulation insertion
Quality in detail

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>WING 50 A</th>
<th>WING 50 SK</th>
<th>WING 105 DI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. width [mm]</td>
<td>2,700</td>
<td>2,700</td>
<td>2,500</td>
</tr>
<tr>
<td>Max. height [mm]</td>
<td>2,500</td>
<td>2,700</td>
<td>2,500</td>
</tr>
<tr>
<td>Max. sash weight [kg]</td>
<td>150 kg (60 kg side hung)</td>
<td>180 kg</td>
<td>165 kg (110 kg side hung)</td>
</tr>
<tr>
<td>Opening types</td>
<td>60°</td>
<td>20° / 30° / 45° / 50°</td>
<td>65° (90°)</td>
</tr>
<tr>
<td>Infill thickness [mm]</td>
<td>24 to 46 mm</td>
<td>24 to 46 mm</td>
<td>9 to 48 mm</td>
</tr>
</tbody>
</table>

Approvals based on product standard for window EN 14351-1

<table>
<thead>
<tr>
<th>Wind resistance</th>
<th>class C4</th>
<th>class C4</th>
<th>class C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air permeability</td>
<td>class 4</td>
<td>class 4</td>
<td>class 4</td>
</tr>
<tr>
<td>Water penetration</td>
<td>E 1,800</td>
<td>E 1,800</td>
<td>E 1,500</td>
</tr>
<tr>
<td>Airborne sound insulation</td>
<td>$R_w = 43$ dB</td>
<td>$R_w = 43$ dB</td>
<td>–</td>
</tr>
<tr>
<td>Burglar resistance</td>
<td>RC2</td>
<td>RC2</td>
<td>–</td>
</tr>
<tr>
<td>Continuous-operational testing</td>
<td>class 2</td>
<td>class 2</td>
<td>–</td>
</tr>
<tr>
<td>Thermal insulation</td>
<td>–</td>
<td>–</td>
<td>$U_r = 2.7$ W/(m²K) up to 3.2 W/(m²K)</td>
</tr>
</tbody>
</table>

The NRWG-System

- Efficient natural and smoke ventilation due to wide opening angles of 60° in curtain walls and up to 90° in glass roofs
- WING 50 A and WING 50 SK available in framed and stepped edge structurally bonded options
- Available for self-fabrication or as pre-assembled units
- Top hung / projecting top hung / side hung / bottom hung outward opening options within curtain walls and glass roofs
- Large window formats possible, up to 3.5 m² in the curtain wall and 4 m² in the glass roof
- Range of actuator and motor options for high performance requirements

NRWG — Technical Data according to EN 12101-2 smoke and heat control systems

<table>
<thead>
<tr>
<th>Opening variant</th>
<th>WING 50 A Single flap</th>
<th>WING 50 SK Single flap</th>
<th>WING 105 DI Single flap</th>
<th>WING 105 DI Two-fold single flap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation situation</td>
<td>tilt/top-hung turn top-hung projecting</td>
<td>tilt</td>
<td>-</td>
<td>tilt/top-hung</td>
</tr>
<tr>
<td>Position</td>
<td>90° 90° 90° 25 to 60° 2 to 15° 16 to 30° 2 to 30°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. width [mm]</td>
<td>2,700 2,700 2,700 2,500 2,500 * 2,500 * 2,500 *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. height [mm]</td>
<td>2,500 2,400 2,700 2,500 5,000 * 2,500 * 5,000 *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. sash surface in m²</td>
<td>3.5 1.89 3.5</td>
<td>4 (inst. position 25-30°) 3.75 (inst. position 30-60°)</td>
<td>4 **</td>
<td>4 ** 4 **</td>
</tr>
<tr>
<td>Max. $A_d$ in m²</td>
<td>– – –</td>
<td>–</td>
<td>7.35 * 5.76 * 7.35 *</td>
<td></td>
</tr>
<tr>
<td>Max. sash weight [kg]</td>
<td>150 60 136</td>
<td>165</td>
<td>165 **</td>
<td>165 **</td>
</tr>
<tr>
<td>Max. opening angle</td>
<td>60° 60° 50°</td>
<td>65° (90°)</td>
<td>65° (90°) 65° (90°) 65° (90°)</td>
<td></td>
</tr>
</tbody>
</table>

* Specifications refer to the complete element (two-fold single flap)
** Specifications refer to the wing of the single flap
Below you will find the reference projects presented in this brochure with detailed information. Further references can be found on raico.de/en/projects/

**P. 1**

**Bürgenstock Hotel – Obbürgen, CH**

**BUilder:** The Bürgenstock Selection, Zug

**Architect:** Kawara Hospitality Switzerland AG

**Fabricator:** Früh Umkirch

**Build date:** 2013 - 2015

**Raico system:** THERM® S-I, WING 105 DI

**Photography:** Daniel Vieser

---

**P. 14**

**University library – Freiburg, DE**

**Builder:** State Baden-Württemberg

**Architect:** Degelo Architekten

**Fabricator:** Früh Umkirch

**Build date:** 2014 - 2015

**Raico system:** THERM® S-I

**Photography:** René Riller

---

**P. 15**

**Climbing hall – Bruneck, IT**

**Builder:** Autonome Provinz Bozen - Council for building

**Architect:** Stifter + Bachmann

**Fabricator:** Lanz Metall SRL Schlosserei Fabbro

**Build date:** 2012 - 2013

**Raico system:** THERM® S-I

**Photography:** © Peter Würmli

---

**P. 16**

**Hotel Störes – St. Kassian, IT**

**Builder:** Evolution Design

**Architect:** Stefan Camenzind

**Fabricator:** Hammer Metallbau

**Build date:** 2016

**Raico system:** THERM® S-I

**Photography:** Zoey Braun

---

**Credits & projects**

**PHOTO CREDITS & Project information**
Civic centre – Böheimkirchen, AT

**BUCKET:**
Community Böheimkirchen

**ARCHITECT:**
Morgan Sindall

**FABRICATOR:**
NMPB Architekten

**BUILD DATE:**
2017

**RAICO SYSTEM:**
THERM⁺ FS-I

**PHOTOGRAPHY:**
Hertha Hurnaus

---

**P. 22**

The GlaxoSmithKline Centre for Sustainable Chemistry – Nottingham, UK

**BUCKET:**
Morgan Sindall

**ARCHITECT:**
Fairhurs Design Group

**FABRICATOR:**
Pacegrade Ltd

**BUILD DATE:**
2016

**RAICO SYSTEM:**
THERM⁺ H-I

**PHOTOGRAPHY:**
Kyra Bullert and Glasveredelung Hunsrücker

---

**P. 23**

**P. 26**

Private house – Schwabmünchen, DE

**ARCHITECT:**
Oberbeck & Weiher

**BUILD DATE:**
2011

**RAICO SYSTEM:**
THERM⁺ H-I

**PHOTOGRAPHY:**
Oberbeck & Weiher

---

**P. 27**

Badewelt – Sinsheim, DE

**BUCKET:**
Unternehmensgruppe Wund

**ARCHITECT:**
Architekturbüro Josef Wund

**BUILD DATE:**
2017

**RAICO SYSTEM:**
Frame⁺ 75 WI

**PHOTOGRAPHY:**
Wolfgang Böttcher & Co.

---

**P. 28**

B&B Hotel – Ulm, DE

**BUCKET:**
Matthäus Schmid & Partner

**ARCHITECT:**
Dodel, Ulm

**BUILD DATE:**
2013

**RAICO SYSTEM:**
Frame⁺ 75 WI

**PHOTOGRAPHY:**
MTZ service centre – Örlenbach, DE

---

**P. 30**

© Depositphotos.com/stokkete

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**P. 32**

Test tower Thysenkrupp – Rottweil, DE

**BUCKET:**
Thyssenkrupp

**ARCHITECT:**
Helmut Jahn & Werner Sobek

**FABRICATOR:**
Strabag Metallica

**BUILD DATE:**
2010-2012

**RAICO SYSTEM:**
Frame⁺ 75 WB

**PHOTOGRAPHY:**
Reiß & Co. Real Estate Munich GmbH

---

**P. 34**

Police Department – Münchengladbach, DE

**BUCKET:**
Munichgladbach

**ARCHITECT:**
fps – Funke Papal Stoom

**FABRICATOR:**
Hunsrücker Glasveredelung

**BUILD DATE:**
2017

**RAICO SYSTEM:**
Frame⁺ 75 WI

**PHOTOGRAPHY:**
BLB Nordrhein-Westfalen/Arnold Glas
P. 35
Office building – Karlsruhe, DE

FASSADEN-PLANUNG:
Freyler Metallbau GmbH

FABRICATOR:
Freyler Metallbau GmbH

BUILD DATE
2012

RAICO SYSTEM:
THERM® S-I, A-I
FRAME® 75 WI

PHOTOGRAPHY:
Johannes Hopermann

P. 36
Children’s hospital/Mother-child-centre Swabia – Augsburg, DE

BUILDER:
Hospital Augsburg

ARCHITECT:
Ludes Architekten-Ingenieure GmbH

FABRICATOR:
Hackenbuchner Fassadenbau GmbH & Co. KG

BUILD DATE
2014

RAICO SYSTEM:
THERM® S-I, H-V
FRAME® 75 WI, 75 WB, 75 DI

PHOTOGRAPHY:
Mark Wohlrab

P. 37
Material Arts – Frankfurt, DE

BUILDER:
Material Arts GmbH, Herr Ardi Goldman

ARCHITECT:
hgp. Architekten

BUILD DATE
2012

RAICO SYSTEM:
THERM® S-I, A-I
FRAME® 75 WI

PHOTOGRAPHY:
hgp. Architekten

P. 38
Siemens Headquarter – Forchheim, DE

BUILDER:
Siemens Real Estate GmbH & Co. KG

ARCHITECT:
Henn Architekten

BUILD DATE
2015 - 2016

RAICO SYSTEM:
THERM® A-I
FRAME® 75 WB, WA, WING 50SK, 105 DI

PHOTOGRAPHY:
RAICO

P. 39
IsarBelle – Munich, DE

BUILDER:
PANDION IsarBelle GmbH & Co. KG

ARCHITECT:
Hierl Architekten, Munich

FABRICATOR:
Alukonstrukt Kft.

BUILD DATE
2011-2014

RAICO SYSTEM:
THERM® A-I
FRAME® 75 WI

PHOTOGRAPHY:
RAICO

P. 40
Le Landeron

BUILDER:
Progin Sa Metal, Bulle

FABRICATOR:
Preface Sàrl, Le Landeron

BUILD DATE
2015

RAICO SYSTEM:
THERM® H-I

PHOTOGRAPHY:
MRJ Rundell

P. 41
Civic centre – Gilching, DE

BUILDER:
Community Gilching

ARCHITECT:
mrb Architekten

BUILD DATE
2016

RAICO SYSTEM:
THERM® H-V
FRAME® 75 LF

PHOTOGRAPHY:
RAICO

P. 42
Private house – Mindelheim, DE

BUILDER:
Private

BUILD DATE
2014

RAICO SYSTEM:
THERM® H-I
FRAME® 90 WB

PHOTOGRAPHY:
RAICO

P. 43
Secondary school – Fully-Saxon, CH

ARCHITECT:
Architektenbüro Lemanarc, Lausanne

FASSADEN-PLANER:
Preface Sàrl,

P. 44
Hangar 108 - Siège Rouen Métropole – Rouen, FR

BUILDER:
Météropole Rouen Normandie

ARCHITECT:
Jacques Ferrier Architecture

FABRICATOR:
CTI BAT

BUILD DATE
2014

RAICO SYSTEM:
THERM® S-I
WING 105 DI

PHOTOGRAPHY:
Luc Boegly

P. 45
West Buckland School – Devon, UK

BUILDER:
Pearce Construction Ltd

ARCHITECT:
MRJ Rundell & Associates

FABRICATOR:
Ridlands Ltd

BUILD DATE
2012

RAICO SYSTEM:
THERM® H-I

PHOTOGRAPHY:
Rainer Rehfeld

P. 46
City Cube – Berlin, DE

BUILDER:
Messe Berlin GmbH

ARCHITECT:
Code Unique Architekten GmbH, Dresden

FABRICATOR:
Metallbau Windeck GmbH

BUILD DATE
2017

RAICO SYSTEM:
THERM® H-I

PHOTOGRAPHY:
Peter Franck

P. 47
Passive house school – Roodt-sur-Syre, LU

BUILDER:
Commune de Roodt s/Syre

ARCHITECT:
Bureau Marc Dieschbourg

FABRICATOR:
Batichemie, Lang Window

BUILD DATE
2012

RAICO SYSTEM:
THERM® H-I

PHOTOGRAPHY:
BREMER AG

P. 50
Primary school – Neubiberg, DE

BUILDER:
Community Neubiberg

ARCHITECT:
Krug & Grossmann Architekten, Munich

FABRICATOR:
Pazdera GmbH, Metallbautechnik

BUILD DATE
2007-2008

RAICO SYSTEM:
THERM® S-I

PHOTOGRAPHY:
© adeco

P. 51
Private house

Furniture Store Finke – Hamm-Rhynern, DE

BUILDER:
Finke - Das Erlebnis-Einrichten GmbH & Co. KG

ARCHITECT:
Blocher Blocher Partners

FABRICATOR:
Freyler Metallbau GmbH

BUILD DATE
2015

RAICO SYSTEM:
THERM® S-I, A-I, A-V, FRAME® 75 DI

PHOTOGRAPHY:
medXpert – Eschbach, DE
THE PROFESSIONALS’ PROFILE

PRIVATE HOUSE

CLAIMED BY
Claudia Reisberg, Eschbach
ARCHITECT
a plus Architekten, Kirchzarten
FABRICATOR
Freyler Metallbau GmbH, Kenzingen
BUILD DATE
2011-2012
RAICO SYSTEM
THERM+ A-I, FRAME+ 75 DI
PHOTOGRAPHY
Johannes Hopermann

P. 52

TH. WILLY CAR CENTRE

CLAIMED BY
W. Schmid AG, Glattbrugg
ARCHITECT
rené schmid architekten ag, Zürich
BUILD DATE
2012
RAICO SYSTEM
THERM+ S-I, FRAME+ 75 WI
PHOTOGRAPHY
Bruno Helbling

P. 54

OZEANEUM

CLAIMED BY
Parc / Peninsula Aquatic Recreation Centre – Frankston, AUS
ARCHITECT
W. W. Ross Architects
FABRICATOR
Fassadenplaner: Laros Technologie Pty Ltd.
FABRICATOR
Mercury Industry Pty Ltd. (über Laros)
BUILD DATE
2012-2014
RAICO SYSTEM
THERM+ A-I, FRAME+ 75 DI
PHOTOGRAPHY
D. & H

P. 56

CENTRE POINT

CLAIMED BY
Almacantar
ARCHITECT
Conrad and Partners
FABRICATOR
Lindner Fassaden GmbH
BUILD DATE
2017
RAICO SYSTEM
THERM+ A-V, FRAME+ 75 SK
PHOTOGRAPHY
RAICO

P. 64

THE PROFESSIONALS’ PROFILE
WHO IS ACTUALLY BEHIND OUR FAÇADE?

Architects and planners appreciate the versatility and reliability of the RAICO solutions. Innovative facade, window and door systems that turn functional building envelopes into sophisticated architecture.

Like these systems, the RAICO Team is also made up of many perfectly coordinated components. First and foremost – motivated, dedicated staff. Add to this extraordinary team spirit and cohesion, plus knowledge and experience.

The different characters and talents give RAICO its unique profile – and enable our solutions to give an individual face to buildings all over the world.

Find out more about working at RAICO at the Career Portal on our homepage!