

# FAÇADE DESIGNS REQUIRING TAILORED REINFORCEMENT IN PRECAST APPLICATION

Building owners are seeking ever more in terms of savings on heating costs, a healthy room climate and the associated prevention of condensation and mould formation. When planning, care and attention must be paid to the building physics and minimising thermal bridges in the area of the building shell. **Kate Pacey** of **Max Frank** reports.

(Photo: BuckleyCrayYeoman)



**FIGURE 1:**  
Dace Road  
development.

**T**hermal bridges can create increased thermal losses and can be caused by material properties and geometry. The impact of thermal bridging often results in heat loss, condensation and ultimately mould formation within the building. Thermal bridging can be combatted through the control of such factors, using credible thermal break solutions.

Thermally insulated balcony connectors (see Figure 2) create a thermal break between an external component and an internal component.

The structural function of the thermal break unit is provided by a reinforcement framework, manufactured from reinforcing steel, which passes between the internal and external concrete slabs,

through the thermal insulation, and thus connects the unit to the building.

Depending on the choice and alignment of the bars, bending moments and shear force can be transferred. The thermal performance is determined by the insulation material between the internal slab and the external concrete member. For fire-

protection reasons, mineral wool insulation with low thermal conductivity is regularly used.

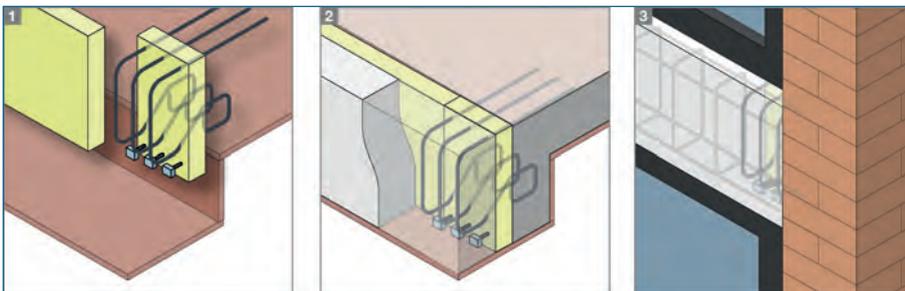
The most common application of thermal breaks is to minimise thermal bridging between the internal concrete slab and external concrete balcony. However, in this case, thermal break units are also supplied to prevent thermal bridging between external in-situ



**FIGURE 2:** Egco box unit with fire-resistant rockwool insulation as standard.



Photo: HG Construction



cladding panels and the internal concrete structure – designed for both horizontal and vertical cladding panels.

**SPECIFICATION**

Dace Road is a 6500m<sup>2</sup> mixed-use development that sits in a prominent location at the entrance

to Fish Island, close to the London Olympic Stadium in Stratford. The area of East London is currently undergoing major regeneration. Existing warehouse structures were demolished to make way for five blocks comprising 144 residential units and a commercial unit – all with new public spaces, complete

**FIGURE 3:** Egccobox units within precast stone banding panels.

**FIGURE 4:** Egccobox installation between cladding panels and in-situ concrete structure.

with a commercial courtyard. Main contractor HG Construction worked closely with Max Frank to overcome initial construction challenges and, through a series of technical workshops, value engineered the product to work within the development’s build. The main applications of Egccobox are explained and illustrated below.

**BALCONIES AND PARAPET WALLS**

Thermal breaks combine structural safety and ideal heat insulation. Egccobox units are usually installed as cantilever connectors in balconies and in parapet walls. The structural stability of Egccobox is provided by a framework of steel reinforcement passing through the 60–120mm thick mineral wool/ rockwool insulation to guarantee fire protection to REI 120. Egccobox reliably connects components, such as balconies, to the building and encloses roof decks through the installation of parapet walls.

**PRECAST STONE BANDING**

The precast stone banding allowed the project contractors to achieve good quality control on the finish of the stone banding to achieve uniform tonal consistency and a distinctive finish. It also provided assurance when planning and programming, knowing that the banding was cast and ready for installation as the frame was erected during construction. As a structural element, the banding also acted as the masonry support for the façade at each storey level. This is where Egccobox came in.

Jonathan Moran, senior quantity surveyor at HG Construction, says, “The thermal connectors were cast in to allow for the banding to act as a thermal and fire-break system.”

Moran adds, “The planned buildings were over 18m tall and therefore subject to Regulation 7 guidelines. This specific application of Egccobox and its fire-compliance features played a key role in achieving building control sign-off on this method of construction from a fire-safety perspective.”

Bespoke Egccobox units were

**FIGURE 5:** Block C, precast panels in place.

designed and fitted within the in-situ façade panels. Figure 3 demonstrates the reinforcement units, cast into the precast banding panels.

The installation process involved casting the specially manufactured Egcobox unit into the floor slab. The thermally insulating cantilever connection system, to REI 120, forms a thermal break between the cladding panels and the in-situ concrete structure, transferring load whilst maintaining the building's full structural integrity (see Figure 4).

BuckleyGrayYeoman, project architect, states, "BGY's façade designs at Fish Island, across two of the five new mixed-use urban blocks, uses a distinctive reconstituted stone horizontal banding, with an accentuated fluted detail at each balcony set within the main body of brickwork. We were interested in tonal consistency and a high-quality smooth factory finish at these horizontal elements.

"During workshops with the structural engineer, Price & Myers, and HG, the main contractor, we quickly established that this could only be achieved with a precast, which would allow this millimetre precision, so finely achieved in the fluting.

"Precast lends itself to casting-in masonry supports that are thermally broken, such as the Max Frank connector. In the horizontal plane at each slab



interface, the thermal break is continuously formed, with no additional bracketry, which is often the cause of issues such as cold bridging and interrupted fire breaks. It also meant that the brickwork, which the banding supports, could be formed entirely without traditional masonry angles.

"Cambridge Precast has become an integral part of the delivery team. The process requires careful sequencing, understanding of tolerances and early co-ordination as these finishing elements had to be ready as the slabs were being poured."

Figure 5 shows the precast stone banding panels in place on Block C and Figure 6 demonstrates the accentuated fluted detail achieved at each balcony.

## SUCCESSFUL

The versatile and adaptable Egcobox thermal break connection system provides fire protection to REI 120 and conforms to the amended Building Regulations 7(2) for combustible products for England. The thermal break units, also available for curved and steel-to-steel applications, were specially designed by Max Frank's technical department and custom-manufactured for this specific project – and its varying applications. The Egcobox software allowed straightforward modelling of thermal break application. By analysing the forces acting at the connection, the software suggested appropriate units that could transfer the moment and shear forces safely from the external balcony to the internal slab side. Egcobox was so successful in this application on both Fish Island Village and Dace Road, it has since been specified and designed for a similar application on a third scheme by HG Construction, which also forms part of this complete development. **c**



**FIGURE 6:** Precision fluted detail achieved.