

LENTON[®] THERMO Balcony System: FREQUENTLY ASKED QUESTIONS

Why does the LENTON[®] THERMO Balcony System use GFRP (Glass Fiber Reinforced Plastics) and not steel or stainless steel in its construction?

GFRP has a very low heat transfer value of 0.7 W/mK. Steel has a heat transfer value of 55-65 W/mK, which is multiple times worse than GFRP and therefore a poor insulator. Stainless steel has a heat transfer value of 15-25 W/mK, which is 20-40 times worse than GFRP.

Why don't other manufacturers offer a GFRP balcony system?

The connection between the coupler and the GFRP bar is complex. It has taken 10 years of development and testing to deliver this product to the market. Additionally, our system has a patent pending (#01731/03).

How does GFRP perform under long-term testing and aging?

In the long-term there is normal settling of the balcony slab (cantilever arm). Additionally, in the long-term, the GFRP could potentially be negatively affected by outside influences such as exposure to moisture and/or chlorides. To block these negative influences we employ safety factors and a multiple barrier enclosure around the GFRP consisting of a sleeve, injection of special resin, and a special coating matrix. All safety factors of the Euro Comp 1996 are applied which assists with achieving the desired long-term performance of the system.

Should the balcony slab be cambered (sloped) upward during construction to account for anticipated deflection or settlement?

Yes, the element has the potential to deflect from the support at a slope of approximately 0.8%. To account for long-term concrete deformation, a 1 % inclined slope is recommended from the building to the balcony slab edge. A slope greater than 1% may be required for large balcony widths and needs to be discussed with the Design Engineer prior to construction.

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How much shear force can the GFRP transfer?

The GFRP bars have been tested for shear load capacity at a distance (gap) between supports of 25 mm. Short-term testing was performed at 20kN per bar. In the LENTON THERMO Balcony System, the shear force bars and tensile bars share the load of the shear force. The relationship of the tensile and shear forces on the GFRP bars is a quadratic interaction and results in only a small amount of interaction between the forces. Therefore overall capacity is not largely affected.

What is the factor of safety for the GFRP?

Through empirical testing EMPA (Swiss Federal Laboratories for Materials Testing and Research) has established a safety factor of 3.2 for the use of GFRP in this type of application.

How does the LENTON[®] THERMO Balcony System overcome the shear issues related to GFRP bar?

Shear performance of the GFRP bar was taken into consideration when EMPA established the safety factor of 3.2 for use in shear. Shear capacity is enhanced with the inclusion of the narrow vacuum isolation element. This shortens the required GFRP bar length, thus reducing the lever arm.

How much force can generally be transferred per loading unit (Qd, Zd)?

This question cannot be easily answered since special factors must be taken into account due to the characteristics of the GFRP. The calculation is divided into two sections: short-term viability and long-term sustainability. In the short-term, the system can withstand large loadings for short intervals but smaller loads for longer intervals. For the long-term sustainability calculation a special load combination (see EMPA recommendation) is considered which reduces the long-term load capacity.

Short term: $Q_d = 15.4\text{kN}$
 $Z_d = 170\text{kN}$

Long term: $Q_d = 6.25\text{kN}$
 $Z_d = 68.8\text{kN}$

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How time intensive is the installation?

The LENTON THERMO Balcony System can be installed in only a few minutes for a typical balcony. The system is very easy to handle and adds very little time to the overall installation time of the reinforcement.

Is the installation difficult?

No. The elements are supplied on a pallet and are easily connected together according to the installation instructions and drawings. Simply insure that the rebar is fully engaged. The LENTON THERMO Balcony System and it's associated insulation components can also be used as the formwork. The extruded insulation spacers easily accommodate penetrations. The system is extremely flexible and allows the balcony elements to be placed in order to avoid recesses, box-outs, etc. (with direction from the Design Engineer). Installation must be performed according to the installation manual.

What slab thickness can the system accommodate?

Standard element depths are 180, 200, 220 and 240mm. Other sizes are available by special request but may require additional lead-time.

Does the system require additional reinforcement?

Yes, standard stirrups (U-bars), hairpins and traverse reinforcement. Please refer to the installation instructions/manual for more information and details.

How much are the transportation costs (freight)?

Freight is free via standard delivery methods. (Expedited delivery requests will be evaluated on a case-by-case basis and appropriate delivery costs may be applied.) The system requires very little storage space since a standard pallet holds approximately 50-70m of balcony length.

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Can the system be used in applications where there is a difference (step/offset) in the elevation of the floor slab and the balcony slab?

Yes. However there may be a reduction in load transfer capacity since the tensile bars may not be located directly in the tension zone of the balcony slab.

How long has this system been on the market and are reference projects available?

Over the past 6 years the system has been successfully installed in more than 40 buildings. Please contact your ERICO[®] Representative for a list of project references.

Can the balcony element be installed and used in a vertical position (i.e. wall connector)?

Yes, but it is not standard and requires additional engineering advice. Please contact your ERICO[®] Representative for assistance.

Can the element be used in steel constructed (framed) balconies?

Yes, but it is not standard and requires additional engineering advice. Please contact your ERICO[®] Representative for assistance.

If lower performance (lower force transfer) is required, is there a lower cost version of the element available?

Not currently. We offer the LENTON THERMO Balcony System elements in standard sizes. However, please feel free to contact us with your special requests.