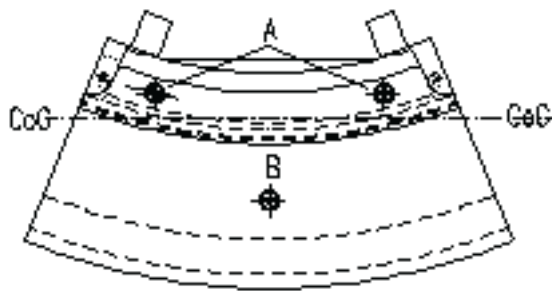


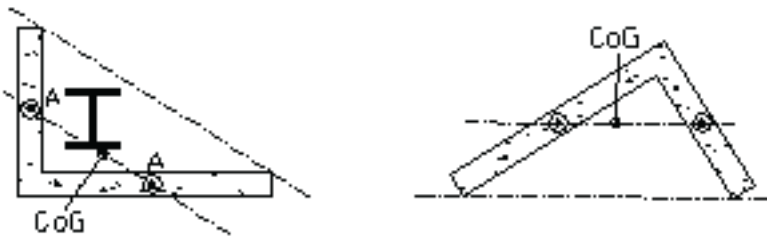
Lifting brackets

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When units are lifted and handled during erection, it is important that they 'hang' at the correct angle. This allows easier positioning, with less effort and safety risk. For most cases the correct angle is the angle they will end up in, and for columns and simple cladding panels this is vertically. For all units this will be achieved if the lifter points are on the top face, over the centre of gravity. However if the unit is other than a plain panel, this may not be possible. In some cases the centre of gravity does not lie directly below a suitable surface, and in others the use of lifters in the top may be prohibited for architectural reasons.



One special case is that of a curved unit such as a cornice. The centre of the load is often offset from the position where lifters can be easily positioned. In these cases, it is often better to have 2 main 'load carrying' lifters (A), plus a 3rd stabilising lifter (B).



Another special condition is an 'L' shaped corner unit such as at a column. The centre of gravity (CoG) is not over any solid concrete, and in the example shown clearly clashes with the column. In such cases there is no clear solution to allow the unit to hang vertical.

Such cases should be considered at an early stage. A compromise solution may be to use long bonds so that the degree of clashing is minimised. When positioning lifter points in such units, it is essential that the line joining the 2 lifters passes through the CoG. Since these units are frequently delivered as an inverted 'V', it is important that the line between the lifters is also horizontal in this position. Failure to achieve this would mean that 1 lifter would take the whole load, which could cause overload.

In some cases the only solution may be a lifting bracket. This is a purpose made bracket that attaches to the unit in a permitted position, and allows rope connection to be over the centre of gravity.

The complex brackets below were a combined lifting bracket and 'rolling shoe' to handle 'awkward' column units weighing 21 tonnes each.



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In contrast, this very simple example of a bracket was attached to the top of a sandwich panel. This fixed to the centre of the inner skin, but allowed lifting over the centre of the combined section. This type also allows 4 lifting inserts to be used whilst only requiring 2 ropes. This allows smaller capacity inserts to be used and minimises the need to thicken up the section.

The more usual type of lifting bracket is an 'L' or 'C' bracket. An 'L' bracket allows 'flat' panels to be lifted without lifters in the top face. A 'C' bracket will similarly allow a panel with an overhanging top to be lifted from the face without the need for a lifting device in the top face.

These brackets take a lot of stress, and for this reason they have to be fully designed. In addition they must be tested and marked with a safe working load (SWL). If there are limitations on their use, i.e. pitching, turning, vertical only etc, then this must also be marked.

Access should always be checked to make sure that the bracket can be unbolted and removed safely after erection of the panel. Close co-ordination with the erection company is vital.

