engineering procedures can be used to determine the actual bending moments and shear forces and the lintel selected considering the above detailed limits on these criteria. Consideration of the possibility of local lower flange buckling may be required.

"Composite Action": Details for lintel installation, including recommendations regarding the use of props, are given for each lintel type in the installation instructions (starting page 78). Other lintel manufacturers may clearly state that their maximum listed loads are achieved with composite action from the supported masonry; this may mean the lintel cannot sustain that load by itself, and if there is an irregularity with the masonry (e.g. an expansion joint) the lintel may possibly fail. Our lintels are capable of supporting the listed loads without 'composite' action unless otherwise stated, so long as the loads are stable. Wet masonry is considered unstable and props should be employed as directed in the installation instructions. Use of props can dramatically reduce deflection of the lintel, by utilising composite action with the masonry, but we do not rely on this to ensure deflections are within allowable limits.

Bearing Load Considerations

Steel lintels carrying up to approximately 20kN are usually adequately supported on 150mm bearings. 100mm is the minimum recommended under BS EN 845-2. Particular care should be taken with more heavily loaded steel lintels, as the load distribution over the bearing of a steel lintel will usually be more uneven than if the lintel were constructed of concrete. Typically, greater load is transmitted to the bearing masonry directly underneath the web of the lintel than elsewhere on the bearing. For this reason, care should be taken if following BS 5628-1 with regard calculation of bearing stresses. We recommend contacting our technical team for assistance with bearing calculations if required, as the load distribution at the bearing is characteristic of the particular lintel design and typically not as indicated in BS 5628-1.

Product Design & Testing

Relevant standards: All our lintels capacities are calculated in accordance with BS 5950-1:2000 & BS 5950-5:1998, with some reference also to BS 449-2. BS 5950-5 is presently the most applicable British standard for lintel design being specifically written for the design of light and medium gauge cold formed structural steel elements (Limit State Design). Specific lintels are load assessed and specified to BS5977-1:1981 and BS5977-2:1983 respectively, and most items in this brochure are manufactured from BS EN 10088 (stainless steels) complaint materials. Where applicable, our lintels also comply with the relevant sections of BS 8215:1991 and building regulations part C with regard to resistance to damp egress and Building regulations part L with regard to insulation.

Design Strengths: Our published load capacities are based on calculations to the above listed standards and generally use Guaranteed MINIMUM 0.2% proof yield strength for design strength. Stainless steels are characterised by gradual yielding and significant work hardening, so ultimate stresses are generally not used in our calculations as the lintel would have experienced unacceptable deflection by that point.

Failure checks: In load calculations for our structural members we take into account the following modes of failure (generally to BS5950):

- *Web Crushing (both webs where applicable)*
- *Web Buckling (both webs where applicable)*
- *Web Shear (both webs where applicable)*
- *Section bending moment capacity (including compression buckling)*
- *Twisting of the member where applicable*
- *Leaf support bending (the 'shelf' deflecting under masonry weight)*
- *Ordinary beam deflection (omitting any effect of composite action)*

Note that our published load figures do NOT allow for the possibility of lateral torsional buckling (LTB) unless specifically stated. It is assumed for all longer lintels that there is sufficient lateral or torsional restraint along the lintel length (i.e. by the wall above or floor joists etc.). For unusual applications where LTB may be a problem we are able to supply appropriately reduced load figures for any of our lintels.

Many of our lintel designs have also been physically tested to BS 5977-2 to ensure the reliability of our calculations.

Load Factors: For all buckling or yield-related failure modes we apply a mandatory lintel design safety factor of 1.6 (as required by BS EN 845-2) to arrive at our published loads. Thus the published loads already include a load factor of 1.6 where the failure mode is member bending failure or some type of web failure. Note that we guaranteed minimum 0.2% proof yield strengths for calculations, typical yield strengths are much higher, providing additional safety margin for material yield related failure modes.

Deflections: We do not apply a safety factor over deflection limit state failure; Leaf support deflections are checked (line load applied ½ course thickness away from the web), the allowed longitudinal twisting limit is 2.0 degrees or less, and bending deflection is limited to 1/360 of the clear span.

Note that these limits are calculated in isolation from installation conditions and may often not be approached due to the composite action of the surrounding masonry.

Interpreting the load curves

The load curves presented in this catalogue not only provide a rapid means of lintel selection but also insight into the structural limitations of the lintels at different lengths, which may be useful when selecting a lintel for an unusual application. The length limits shown (vertical lines at the end) are set for practical reasons and can sometimes be extended. The other limits can sometimes be extended as well with the addition of suitable strengthening.

Cavity Lintels: By way of example, the CD32 load curve (page 8) represents a typical lintel; the flat section shows the bearing failure limit (typically web crushing or buckling), the slope to the left shows leaf support deflection limitation, the slope to the right up to the inflection point at 5700mm is bending limitation, and beyond the inflection point is a deflection limit. All the cavity wall lintel curves exhibit these characteristics though some are less obvious.

Solid Wall Lintels: These lintels exhibit similar characteristics in their curves as cavity wall lintels. Open section lintels, such as brick support angles, over longer spans are likely to fail by twisting (torsional deflection) before any other limit, so the other limits may not be obvious.

Outer leaf lintels: Generally, the hollow lintels follow the same pattern as the cavity wall lintels, their hollow section being very resistant to twisting. The open sections however are typically limited by twisting over the entire load curve, as described for the solid wall lintels.

Thermal Performance

Our lintels are manufactured standard in LDX2101® stainless steel, which has around 1/5th the thermal conductivity of galvanised mild steel, meaning significantly better thermal performance than a similar mild steel lintel.

This is becoming more and more important as architects strive to reduce U-values in line with building regulations part L requirements.