Static strength requirements of anchors in accordance with recommendations in 12.3.5 of BS 7985

There appears to be some confusion about the 15 kN static strength recommendation for anchors in 12.3.5 of BS 7985. This explanation attempts to clarify the recommendation.

The maximum impact force on a person recommended by all the European Standards covering personal fall protection equipment is 6 kN. This is a dynamic force. Most personal fall protection equipment is tested dynamically, but usually the only requirement is that it holds the fall. The 6 kN limitation is usually achieved by the incorporation of an energy absorber in the system.

All personal fall protection equipment is also tested statically. The European Standards committee responsible has generally adopted a safety factor of 2.5. Occasionally it is less, at 2. Therefore, the minimum static strength for personal fall protection equipment is generally 15 kN, but occasionally 12 kN. For textile components the static strength is increased, in some cases to 22 kN. Connectors are likely to have a minimum strength of 20 kN, when the new revision of EN 362 is published.

There is one major anomaly to the above, and that is the static strength required by anchors in EN 795, Anchor devices, which is currently 10 kN. This issue will be addressed during the forthcoming technical revision of EN 795.

If it is accepted that the anchor device is part of the fall protection system, it makes sense that it should not be weaker than the rest of the system. Anchor devices are just as likely to be abused and suffer wear and tear as other components in the system and thus need a similar safety factor.

Clause 12.3.5.2 of BS 7985:2002 recommends a minimum anchor strength of 15 kN. This provides a safety factor of 2.5 on 6 kN, which might seem high. However, put in context, a person weighing 100 kg falling 4 m on a 2 m lanyard without an energy absorber (a very worst case scenario) will impose a force on an anchor of around 18 kN. While highly unlikely to happen, this gives an indication of the magnitude of forces that could be involved in a fall. So asking for a static strength of 15 kN is not 'going over the top'.

Unfortunately, some construction professionals, e.g. architects and engineers, are taking 15kN as the characteristic live load (Q_k) and then applying normal partial factors for load (γ_f) to it to get their design load (i.e. the ultimate load). This is incorrect. Designers using limit state methods should consider 15kN as the design load and calculate the design resistance based on γ_m chosen to suit their particular situation.

All that is required is that if the anchor device were to be tested statically in place, in the direction in which the forces would be placed on it if a fall occurred, it must be able withstand a static force of 15 kN, <u>once</u>.

It is not suggested that anchor devices should be tested to 15 kN after installation. However, the recommendation in 12.3.5.1 of BS 7985 for anchors to be “unquestionably reliable” could imply, where practicable, the testing of anchor devices placed in the medium to which they will be attached on site, e.g. concrete of a particular mix.

The question probably arises as to what any proof loading force should be, but this is outside the scope of this paper. Any proof testing proposed needs to consider carefully the effect on the anchor and the substrate, so that the subsequent integrity of the anchorage is not compromised.

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29.08.02