

KEY POINTS - Corrosion protection

The designer should ensure that:

- the corrosion protection system is compatible with other paint and fire protection systems to be used, since any incompatibility may only become apparent on site
- the design is such that the need to apply corrosion protection at height is minimised
- the protection specified is as resistant to damage during transportation and erection as possible.

7.7.2 Fire protection systems

Regulations dictate that most classes of building require fire resistance. An unprotected steel member could reach temperatures of more than 900°C in a fire. However, steel will begin to lose strength (and stiffness) at around 200°C, and its strength is halved at approximately 600°C. In buildings where fire resistance is required, steelwork is normally fire protected to enable the members to be designed using room temperature properties of the steel. However, steel members do not always have to be protected to achieve fire resistance. Some members, such as slim floor beam⁽⁵⁰⁾, can achieve 60 minutes fire resistance without applied protection. The fire resistant design of steelwork is covered by Part 8 of BS 5950⁽⁸⁵⁾, which contains approaches to reduce, or sometimes eliminate, fire protection of the steelwork.

Building regulations specify the degree of fire resistance in units of time (30 mins, 60 mins, 90 mins etc.). The required fire resistance depends mainly on the building height and usage, and whether sprinklers are installed. The most common requirement is for 60 minutes fire resistance. It is worth noting that the fire resistance periods do *not* represent the time during which the structure must remain standing so that occupants can escape. Fire resistance is a measure of performance determined using a standard fire resistance test, and is used by regulators to judge perceived risk and consequences for the occupants, contents and building itself.

Several types of surface treatment may be used to provide fire protection. Spray is the least expensive way to protect the steelwork, costing £ 8 to £12 per square metre applied (1996 prices), depending on thickness. Spray is generally in the form of cementitious or vermiculite material, is quick to apply, and can be used to cover complex details. Disadvantages of using a spray are that the application may sometimes be messy, difficult in winter, and may interfere with other trades. Some spray may also be aesthetically unacceptable for visible parts of the frame (see Figure 7.9). All areas of the steelwork must be suitably covered. For example, if spray is used on members above a suspended ceiling, the programming of work may well require that the protection is removed locally to allow subsequent fixing of ceiling hangers to the frame. Such areas need to be touched-up before completion.



Figure 7.9 *Sprayed fire protection*



Figure 7.10 *Board protection (Vicuclad, courtesy of Promat Ltd)*

An alternative to sprayed protection is boards, which are glued, screwed or otherwise attached to the steel members to provide insulation. They have the advantage that fixing interferes less with other trades on site. Boards are visually superior to sprays, and are therefore often used on visible members such as columns or exposed beams (see Figure 7.10). The principal disadvantage of boards is that for a comparable degree of protection, they are typically twice as expensive as sprayed material per unit area. It must be remembered, however, that the required area is less with boards, since they box-in a member, rather than being applied to all surfaces.