

## **Fire Resistance In Timber Framed Buildings**

It should be remembered that ALL buildings burn and all buildings of any description must comply with certain fire prevention codes. These codes are either determined at national government or local municipality level. Timber framed structures designed and built by Snorbans comply with either the local or national code of the country we are working in or the national American/ European standard – whichever is the more stringent. Timber deterioration in fire is measured by the “char rate” and, despite the common misconception, timber is the safest material commonly used material in construction.

It should also be remembered that the vast majority of house fires start internally as a result of occupant carelessness and it is the contents of the house that burn easily. Smoke is the killer and if a person has not exited the building before the applied fire protection barriers are reached, it is unlikely that he or she will exit the building alive. With this in mind, the length of fire protection applied internally is of little consequence in terms of saving lives.

Reinforced concrete, masonry and steel are the main methods of traditional construction in many countries and concrete/masonry suffers from ‘explosive spalling’ in fire, due to the moisture always trapped, turning to steam and causing the spall.

It is also claimed that the differential expansion between the rebar and the concrete weakens any load-bearing element quite quickly. Steel will buckle and twist causing collapse. Timber on the other hand, has a known char rate and the type of timber we use is noted at 0.65 mm/min on the exposed face, plus a small factor to account for heat damage. Methods of calculation are universally accepted.

There are several ways of dealing with fire prevention and protection, which include:

### **Protection by over-sizing**

Timber burns from the external surfaces only. After ignition of the timber, there will be a charred region which acts as an insulator and tends to protect the wood fibres in the centre of the beam. With time, some of the timber cross-section is lost. However, the remaining timber can and does have structural strength and stiffness. So, by calculating the dead and imposed loadings of a subject building we can accurately specify the minimum dimensions required to give 30/60/90/120 minutes (or whatever is required) before any collapse is likely. If we then increase the timber sizes we automatically extend the period of fire protection considerably, and this is the industry norm.

### **Protection by cladding**

The interior fire integrity of a building is dictated by using Internal Surface Linings (ISL’s) that, in Europe, must meet the minimum Class 0 UK (Euroclass B) and Class 1 UK (Euroclass C). The simple expedients of cladding the timber frame internally with 12.5 mm thick gypsum plasterboard affords 30 minutes fire protection, before the timber studs are reached – then the over-sizing margins kick in. Again, simply by adding a second layer of 12.5 mm thick gypsum plasterboard over the first doubles the fire protection to 1 hour – again this is fire protection before the fire reaches the timber studs. Specialist boards are available which will increase the resistance to even longer periods of protection time although budget is the governing factor in most cases.

## **Protection by Intumescent Applications**

The external cladding can be protected by the application of "Thermocoating". A thermocoat product will always have been tested to meet standards laid down exactly as the cladding above. A minimum standard is 30 minutes fire protection although some two-pack lacquers can give upto 120 minutes. There are also several water-borne applications that can be applied by those who wish to embrace more ecological materials.

**The Timber Research and Development Association (TRADA)** is an internationally recognized center of excellence on the specification and use of timber and wood products. There extensive research on the fire related performance of various types of structures concluded that "Timber frame performs as well as other construction in fire and life safety is at no greater risk.

## **Footnote**

The percentage of timber framed buildings erected increases each year as people become aware of the massive benefits of the systems available. Here are some global figures:

Ireland 35%; United Kingdom 60%; Scandinavia 95%; Canada 90%+; USA 90%+; Germany 35%; Netherlands 28%; Australia 85%; New Zealand 90%; Japan 52%.

Overall timber framed construction accounts for 70% of all new start (low rise up to 7 floors high) buildings in developed countries.