

Testing times for steel beam fire protection systems

In response to the rising popularity of multi-storey steel frame 'towers' in global cities and towns, changes in standards and higher quality and strength of steels being applied, building science centre BRE has invested in a new steel beam test rig can apply loads of up to 1000kN on a protected steel beam under fire testing conditions. Steve Howard explores the issues around this investment

Data from the UN indicates that the world's population is growing by 74 million each year. This means that by 2050 the global population will reach 9 billion. Cities around the world are being extended to meet these population demands – new homes, schools, hospitals, factories and offices and new cities are being created from scratch in places like China. In the rush to develop, land has become an expensive commodity, and this is pushing developers to minimise the footprint of their buildings and maximise the space by building very high.

Steel is the primary structural material in these taller buildings (the first skyscrapers adopted the steel frame method of construction where vertical steel columns and horizontal beams are constructed in a rectangular grid to support the floors, roof and walls of a building which are all attached to the frame). In these buildings the beams and columns that form the load bearing frame are larger than ever.

Spurred on by tougher standards, better performance data and innovation in products, fire protection has evolved significantly over the past decades in preventing the rise in temperature of the protected substrate to maintain its structural integrity. This gives people time to escape and the fire services time to extinguish the fire reducing damage to the asset and its surroundings.

The need to continue vigorously testing the performance of the fire protection systems applied to these larger load bearing elements is critical for the future giving designers and engineers the ability to specify the right levels of protection.

For this reason BRE has invested in a new rig for testing steel beams used in multi-storey buildings. Aimed at manufacturers of fire protection systems such as intumescent paints, epoxy coatings, cementitious coatings, board products and ceramic blanket coverings, the new rig can apply loads of up to 1000kN on a protected steel beam under fire testing conditions.

This more than doubles the capacity of our previous test rig and together with our loaded column furnace (capacity of 4900kN), delivers a unique fire resistance testing capability in the UK.

Essentially what the rig does is apply a load to the beam and its protective coating whilst the beam is being exposed to temperatures of up to 1100°C¹ within the test furnace. Our experts then measure the deflection (structural damage) of the beam and steel temperature over time and this determines the effectiveness of the coating.

Manufacturers of fire protective coatings operate in global markets. The performance data they get by testing with us will undoubtedly give them the competitive edge to meet the challenging compliance standards in the UK, Europe and around the world.

For further information please contact our customer services department – enquiries@bre.co.uk quoting ref:testrigFME

¹ The temperature is based on a standard time/temperature curve, therefore the peak temperature is dependent on the duration of the test, 1100°C relates to a test duration of approximately 170 minutes.

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