Summary

The current German regulations for determining the load-bearing capacity of unprotected timber connections comprised of rod-shaped connecting elements in the event of fire are based on data gained by empirical studies. The research project „rod-shaped connecting elements in case of fire, a basic study" [14] is funded by the Deutsche Institut für Bautechnik (DIBt) and coordinated by the Deutsche Gesellschaft fuer Holzforschung e.V. (DGfH). In this project a theoretical model was developed in order to ascertain the load-bearing capacity of double-shear drift bolt joints when exposed to shear in case of fire. The development of this model allowed for the representation of temperature increase within a joint by means of RD calculations in the event of fire. On the basis of the temperature development algorithms for the assessment of the load-bearing capacity in case of fire were elaborated. Resultant from extensive calculations a universally valid, practicable assessment concept was evolved for double-shear drift bolt joints exposed to shear in case of fire. It enables the determination of the load-bearing capacity of the specific connection for a given fire resistance period duration from the characteristic load-bearing capacity under normal temperature.

For the verification of the theoretical findings as a precondition for the encoding of the future fire-protection standards a series of experiments was carried out by the Bundesanstalt für Materialforschung und –prüfung (BAM) Berlin on double-shear wooden joints with drift bolts. Focal point of the research were experiments dealing with connecting geometry exposed to fire for 30 minutes. In addition two specimens were assessed and tested for 60 minutes fire resistance duration.

The fire experiments verified the developed concept for fire assessment making it thus possible and recommendable to integrate this method into the future fire protection standards. The research has moreover shown that an expanded application of the method on other forms of joints would be useful. The studies carried out in this project prove that the usual assessment methods are equally applicable to pinned connections in case of prior knowledge of the temperature dispersal within the joint. It is therefore frequently possible to prove sufficient load-bearing potential of unprotected joints in the event of fire for a fire resistance duration of 30 or 60 minutes. The construction expenditure compared to the one which was previously needed for protected joints would thus be considerably less.