

# Theoretical and experimental basic examinations for fire protection of multistorey buildings in timber-frame construction

## Summary of part 1 - Theoretical basic examinations

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If the building sector should contribute to securing a striving economy, it requires, that building constructions and materials are used more frequently, which fulfill the demand of a lower material- and energy consumption. Wood as the material with the highest resource efficiency is the decisive raw material for an ecological and economical building in the future, also in the area of multi-storey and compressed residential Buildings. However at the moment the demand of the fire protection codes stand opposed to this. In medium terms this isn't compatible with socialpolitical acceptance targets and the securing of our prosperity in the future.

The assessment of a realistic existing fire protectional risk of multi-storey timber buildings demands experimental experiences with the fire behaviour of construction members, construction groups and buildings. The analysed national and international examination for the fire behaviour of timber pieces and timber buildings show, that experiences concerning the fire behaviour of timber pieces and buildings in timber construction (natural fire tests) are existent and applicable. With presently necessary divergences from building regulations, solutions in timber frame construction have been shown in this research, sustaining the necessary fire protection security level. An important reduction of the fire risk is achieved by the „BA“ building construction, which is not considered in building regulations. This means the non combustibility of the material surfaces and temporal variability of the intensity of capsulation of the fire loads of load bearing and supporting members in timber frame constructions. During the theoretical examinations it has been proven that the aspect of the increased immobile fire loads of timber buildings at consistent BA building construction is negligible and will be easily reached by the non building regulation influenced share of the mobile fire loads. In a risk estimation of human security, the material of a building construction loses even more importance, if the possible toxic potential of the fire products of furnishings (mobile fire loads) are considered. The construction material timber is unimportant as initial fire cause in consistent „BA“ construction in connection with insulating materials of the construction material rate A. Through structural constructive measures, e.g. arrangement of installation layers, the risk of foreign ignitions of the load bearing structure (e.g. smoldering due to short circuit) can be eliminated.

Solutions and construction examples for the fire protectional safe construction of timber pieces and intersections have been developed. The necessary proof of usability, e. g. for fireproof doors, fire stop for wall penetration (including poke-through openings required for plumbing or electricity service), intersections and penetrations in timber stud walls will be continued in the experimental examination section (level 2) of the research study.

From the authors view there is no doubt to build multi-storey timber constructions up to 5 floors in Germany. On basis of the risk estimation, the programme of a Model Building Code for multi-storey timber constructions has been developed, which has to be used as basis for the discussion towards the building regulation and therefore the permitted areas of application and the demands of multi-storey timber buildings. With the recommended planning and constructive measures an overcompensation of the fire risk takes place in certain areas and therefore increases the security level. This is the result of the planning demand of a second structural rescue path (fire exit) in timber buildings with more than 3 floors.