

A series of twelve full scale experiments with upholstered furniture and beds has been carried out. Ten experiments were performed inside an extensively equipped compartment with a door opening. In order to study the influence of the room on the fire development two experiments were carried out in the open outside the compartment.

One experiment in the room was made with restricted ventilation simulating a room with only a small window open. During the experiments measurements were made of temperatures, heat fluxes, rate of heat release and smoke production.

The concentrations of oxygen, carbonmonoxid, carbondioxid and nitrogen oxides in the results from one experiment, a sofa with filling of standard polyurethane and cover of 100 % acrylic fibres is presented in detail. From the rest of the experiments the temperature time curves and the rate of heat release curves are given. The flame spread rates for the tests with mattresses and beds, determined from videofilms of the tests, are presented.

Conclusions that can be drawn from the results are that the covering material of the furniture plays an important role in the development of a fire. It is possible to produce upholstery materials that are difficult to ignite even with very powerful ignition sources. The room has a measureable influence on the fire development when the release of energy exceeds 1 MW.

An attempt is made to compare simple theoretical models for room fires with experimental results. A correlation equation based on regression analysis by NN for assumption of the temperature in the hot upper layer in the room is applied to the experiments and gives good agreement with the experimental results. A number of models for determining flashover are also utilized, and the results are in consistency with the experience gathered during the series of experiments.

The calculations presented in this report were all carried out without help from computers. A more comprehensive theoretical analysis will follow in part 2 of the report.