Effectiveness of sprinklers in residential premises:
Section 7: Other considerations and Recommendations for further work

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7 Other considerations, and Recommendations for further work

This Project has established a baseline for future comparisons. However, a number of issues were not covered in the FRS technical work programme. Some of these issues are described, as follows:

7.1 Concealed and recessed pattern residential sprinklers

Concealed and recessed pattern residential sprinklers are so called because they are recessed into the ceiling; one variant is concealed by a plate which detaches and falls away under the influence of heat.

Concealed sprinklers are often preferred by architects, specifiers and end users because of their relatively low visibility and for this reason are claimed to be one of the most commonly used residential sprinkler patterns of which there are numerous designs.

However, they do not comply with the BS DD 251 recommendations for positioning of the sprinkler heat sensitive element, to ensure rapid response. A note in DD 251 indicates that they may be used with the approval of the "authority having jurisdiction".

The thermal sensitivity test in BS DD 252 is not suitable for evaluating concealed and recessed sprinklers and as a consequence of this the recommendation is appended with a note stating "For sprinklers which do not fit into the wind tunnel, equivalence of sensitivity is determined by a fire test (not yet standardised)". It is however unlikely that currently available concealed and recessed sprinklers would qualify for the "quick" thermal sensitivity rating specified in DD 251.

Commissioning and maintenance of concealed sprinklers is more complex than for other sprinkler patterns as they are more difficult to inspect and can be disabled by incorrect installation and inappropriate treatment after installation, such as painting.

Examination of concealed and recessed sprinklers was considered, but was not felt to be high enough priority for this. It was essential to have a thorough understanding of sprinkler types which were within the scope of DD251 and DD252, particularly with respect to thermal sensitivity and location of the heat sensitive element relative to the ceiling line.

7.2 Alternative fire suppression systems

There is growing concern about the inappropriate use of alternative water-based fire suppression systems for domestic and residential premises. The approving authority needs to satisfy itself that these systems are appropriate for use in residential or

domestic premises, i.e. for appropriate room sizes, ventilation conditions and fuel load arrangements.

FRS, BRE has been commissioned by Buildings Division, ODPM to carry out a new six-month predominantly desk based study on fire suppression in buildings using water mist, fog or similar systems. This project is due for completion around April 2004.

The aim of this new Project is to determine the nature and range of water mist, fog or similar systems that are currently being installed in residential and other premises in the UK. The specific objectives are:

- to determine what, how many and where water mist, fog or similar innovative suppression systems are currently being installed in residential and other premises in the UK
- to determine to what standards these systems are being installed
- to determine how they are being proved as fit for purpose
- to recommend what further work may be appropriate/necessary to provide full consideration of the effectiveness of these systems.

The FRS approach will be to collect and analyse information and data on these systems via a combination of a specially-designed questionnaires, selected face to face interviews, a literature review and a web search, analysis and provision of recommendations in a Final Report that will be made publicly available.

7.3 Residential sprinklers as compensatory features

This Project considered residential sprinklers as an additional safety measure. Residential sprinklers could become cost-effective in a broader range of buildings if compensatory features were considered.

In Approved Document B (Fire safety) there is scope to use residential sprinklers as a compensatory feature, *"..there is no obligation to adopt any particular solution contained in an Approved Document if you prefer to meet the relevant requirement in some other way…."*. There is a need to understand the provision for which residential sprinklers will be a compensatory feature and how sprinklers will perform compared with that provision

There are potentially a very large number of these issues that could be considered.

It was decided that the examination of compensatory aspects would be beyond the scope of this Project, although it is clearly an important issue which needs to be addressed.

7.4 Water supplies initiatives

At the start of this project there were concerns about water supplies for fire sprinkler systems (including domestic and residential).

Two working groups involving the water supplies companies and organisations with interests in sprinklers were set up to resolve some of these concerns and provide guidance.

One working group has prepared a technical guidance note and the other a policy guidance note (both awaiting publication)

These documents establish principles for connection to water mains and outline how water may be used by sprinkler systems. This guidance will enable both parties to cooperate and establish good working relationships with each other.

7.5 Targeting and assessment of “high risk” properties on a case-by-case basis

This project has looked at a range of different domestic and residential dwellings, albeit at a national level, in order to identify which types had high enough risks to justify the installation of sprinklers. It was concluded that residential care homes, and blocks of flats greater than 10 storeys high, fulfilled the cost-effectiveness criteria.

However, it may be that other types of dwelling, for example single-family housing in an area of high social deprivation, may have fire risks that are considerably higher than the national average for the dwelling type. If so, the risks may be high enough to make sprinklers cost-effective there too. The cost-benefit methodology developed by this Project could be used to make assessments of individual cases. It would be beneficial to develop a simple spreadsheet-based tool that stakeholders could employ for this purpose.

A positive aspect of examining individual cases in this way is that accurate cost quotations for installation, water supply and maintenance can be used, rather than the “typical national” values quoted in this report. Also on the positive side would be the fact that local risk values were used. On the negative side though, local risk values would be subject to large uncertainties, simply due to the lack of statistics.

In order to identify “high risk” areas it will probably be necessary to rely on the relative frequency of fires per building per year. This is reasonable, as the Pilot study of this Project showed that the risk of death or injury per fire was fairly constant, and thus the risks per building mainly dependent on the number of fires.

7.6 Summary of recommendations for further work

Further work is recommended as follows:

1. Investigation of the suitability of concealed and recessed pattern sprinklers in residential premises, particularly with respect to their effectiveness and maintainability.

   Proposed elements/options of the work programme would include:

- Developing and evaluating a new test method of rating thermal sensitivity for these types of product
- Carrying out an experimental programme of realistic/stylised fires to assess their effectiveness
- Reviewing maintainability issues.

2. A cost benefit analysis of residential sprinklers as a compensatory feature using probabilistic modelling to estimate risk.

   This would include:

   - Consideration of a number of “typical” examples to demonstrate the approach to be followed when evaluating different building schemes on a case-by-case basis. Some of the demonstration cases could be actual schemes to provide more accurate cost estimates.
   - Evaluation of the benefits provided by residential sprinklers compared with the other fire safety provisions that residential sprinklers will be “traded-off” against. This would be on a theoretical basis, using modelling to estimate the risks.

3. Development of a user-friendly tool for performing cost benefit calculations for residential sprinklers for stakeholders use.

4. Assessing the consequences of adopting cost reduction measures in residential sprinkler installation design.

   This would include:

   - Developing a performance based methodology for sprinkler head evaluation and installation design requirements;

   - Assessing the consequences of the omission of sprinklers from uninhabited areas such as loft spaces.