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Report of the Review Panel on Building Standards (Fire Safety) in Scotland

June 2018

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EXECUTIVE SUMMARY

This report presents the conclusions and recommendations of the Review Panel on Building Standards (Fire Safety) in Scotland, established by a Ministerial Working Group on Building and Fire Safety in September 2017 as part of their response to the fire at Grenfell Tower. The Review Panel met three times and after each meeting the agreed notes of its discussions were reviewed by an international group of fire safety regulators. The principal conclusions and recommendations are:

- 1) The current structure of mandatory functional standards supported with performance based or prescriptive guidance in the Technical Handbooks works and should be retained.
- 2) The Technical Handbooks should make clearer the status, functions and limitations of the guidance.
- 3) A better mechanism is required for the verification of fire safety engineering solutions for complex buildings and this might be in the form of a national “hub” to verify such applications.
- 4) Changes are needed to the simple guidance on external cladding, cavities and fire spread on external walls. In particular, the restrictions on the use of certain materials should be applied to all buildings with a storey at a height of over 11m, rather than 18m as at present. Further, these restrictions should apply to entertainment and assembly buildings, residential care homes and hospitals of any height. However, full scale fire testing should still be an alternative method of showing compliance.
- 5) Changes are needed to the simple guidance on escape. In particular, in domestic buildings over 18m there should be two stairways and fire service activated evacuation sounders in each flat.
- 6) The requirement for automatic fire suppression systems should be extended to some additional building groups. In particular, Houses in Multiple Occupation (HMOs) used for “care” 24/7 and HMOs with 10 or more residents.

FOREWORD

The scale of the tragedy at Grenfell Tower just over a year ago gave urgency to this review of the Building Standards for fire safety in Scotland and the Review Panel was established with commendable speed by Scottish Ministers. Our brief was to determine what, if anything, had to be changed, revised or improved in the building standards system and the specific guidance on fire safety in high rise domestic buildings.

In undertaking this work we have been very conscious that the Grenfell Inquiry itself was also beginning its painstaking work to establish exactly what happened on the night of the fire and why. As it is only in the last few weeks that the public hearings have begun, it is recognised that the conclusions in this report may need to be revised in due course. However, some of our recommendations are sufficiently important that they should be implemented as soon as possible.

The Review Panel brought together an extremely experienced group of fire safety engineers and specialists, along with representatives of the major construction bodies in Scotland and the various regulators. It was also greatly assisted by a small international group of fire safety regulators from other jurisdictions, who ensured that there was an appropriate degree of reflection and benchmarking after each meeting. I have been grateful not only for the commitment of those involved, both from Scotland and further afield, but also for their determination to achieve a high degree of consensus on what needed to be done. I would wish to express my thanks to each of them. I have also benefited from the help and support of Scottish Government civil servants, especially those within the Building Standards Division.

Paul Stollard

INTRODUCTION

1. The tragic fire in the Grenfell Tower on the 14 June 2017 which led to the deaths of 72 people was the worst fire in the United Kingdom since, at least, the Second World War. In response the Scottish Government immediately set up Ministerial Working Group on Building and Fire Safety to take forward a programme of work to look at not only high rise buildings in Scotland, but also the standards and regulations covering their construction, management and occupation. This programme of work also took account of other recent studies of the building standards system, including that undertaken into Edinburgh schools.
2. This report presents the conclusions and recommendations of one such review, the Review Panel on Building Standards (Fire Safety) in Scotland chaired by Dr Paul Stollard. A parallel Review Panel on Compliance and Enforcement, chaired by Professor John Cole, was established at the same time and the work of the two panels was co-ordinated by the chairs.
3. A key part of this work was the examination of the functioning of the building standards system in Scotland as established by the Building (Scotland) Act 2003 and the subsequent Building (Scotland) and Building (Procedure) (Scotland) Regulations 2004. These set mandatory functional standards which must be achieved in all new buildings and building work, including renovations and refurbishments. It is the responsibility of designers to meet these functional standards and the local authorities were appointed to verify that they are achieved. This is done by only granting a Warrant for work to commence once the plans have been examined and by accepting the Completion Certificate before the building can be occupied. The Completion Certificate confirms that the building has been built in accordance with the warrant drawings and the regulations, and verifiers must refuse to accept a Completion Certificate if they do not believe this to be the case.
4. Fire safety is covered in 15 functional standards within Section 2 of the Building (Scotland) Regulations 2004. These are supported by two Technical Handbooks (Domestic and Non-domestic), which provide guidance on methods of satisfying the functional standards. However the Technical Handbooks are not mandatory and designers can offer alternative methods of compliance with the functional standards for verification by local authorities.
5. It is worth stressing that the building standards system, the functional standards, and the process for verification in Scotland is completely separate and different from the building regulations system in England. This relies on Approved Documents, Approved Inspectors and local authority building control departments, it was this system which applied to the refurbishment of Grenfell Tower.
6. Since 2005, Section 2: Fire of the Technical Handbooks have included guidance on inhibiting the external spread of fire, fire spread within cavities and fire spread in external wall insulation. In particular in high rise domestic buildings (with a storey at a

height of over 18m above the ground) this has been achieved by tightly restricting the materials which can be used. For this reason there has been very limited use in Scotland of combustible rain screen cladding and insulation materials similar to those used in the refurbishment of Grenfell Tower.

METHODOLOGY

7. The Review Panel on Building Standards (Fire Safety) in Scotland brought together the best available advice from within Scotland, as well as from the rest of the United Kingdom and other jurisdictions around the world. Individuals were appointed either because of their personal knowledge and expertise, or because they represented key stakeholders in the fire safety of high rise domestic buildings. Unsurprisingly there was a degree of overlap between the membership of the Review Panel and other inquiries which had already been established, or were to be established, examining similar issues. Two members of the Review Panel are expert advisers to Grenfell Inquiry chaired by Sir Martin Moore-Bick and one is providing advice to the Metropolitan Police on the on-going criminal investigations. Others are closely involved in the programme of fire tests which has been undertaken. Representatives of the other building standards jurisdictions (England, Wales, and Northern Ireland) were invited. The Scottish Fire and Rescue Service and Local Authority Building Standards were also represented. The membership is set out in Annex 1.
8. It was agreed that the notes of the meeting would be made public once agreed by all members. These would present the collective views and the consensus which the panel could achieve and opinions would not be attributed to individual members.
9. The international group comprised of four members of the Inter-jurisdictional Regulatory Collaboration Committee (IRCC), representing Australia, Austria, Netherlands and the USA. This group met separately approximately 4 - 6 weeks after the full Review Panel to provide an international perspective and to suggest alternative or additional ideas.
10. The international sub-group agreed that their role was to add a wider and independent perspective on the discussions of the main Review Panel. A flow diagram was developed during the second meeting of the international group (Edinburgh 7 February 2018) which summarised this, and a copy is attached to this report as Figure 1.
11. Both the full Review Panel and the international sub-group met three times and the agreed notes of their meetings are available on the [Scottish Government website](#).
12. In the autumn of 2017 a questionnaire survey into the fire safety of high rise domestic buildings was circulated among the 13 members of the IRCC and its results also fed back into the deliberations of the Review Panel. The results can be viewed [here](#).
13. At the first meeting the remit and objective of the Review Panel were discussed and accepted, this was to:
 - review standards in light of evidence from Grenfell Tower
 - comment on appropriateness and relevance of the current standards and guidance
 - consider the relevance of British Standard and European tests
 - provide an opinion of whether or not any changes are necessary, and

- keep this under review, as further evidence emerges.

14. The formal scope and remit are set out in Annex 2.

15. The Review Panel was conscious that they were meeting before the Grenfell Inquiry had begun its public hearings and therefore any conclusions to which they came might have to be reviewed in light of the evidence presented to that Inquiry and its eventual findings.

CURRENT STRUCTURE OF THE BUILDING STANDARDS

16. There was agreement that the current structure of the Building Standards with mandatory functional standards supported by performance based or prescriptive guidance in the Technical Handbooks (Domestic and Non-domestic) was fundamentally sound. However it was clear that there is a need to reinforce the principle that while compliance with the functional standards is the mandatory requirement, this is possible without following the guidance in the Technical Handbooks. The guidance in the Technical Handbooks, although useable as default requirements and offering a benchmark against which alternatives can be verified, does not always have to serve as such a benchmark.
17. There was felt to be merit in the introduction of alternative guidance, which makes it clearer that there is more than one way of achieving compliance with the functional standards. The responsibility for choosing the design approach lies with the designer.
18. There was discussion on how such alternative guidance could be structured and the international group proposed a model, which was endorsed by many of the main Review Panel, as follows:
 - a very prescriptive set of guidance, available for all to use
 - a middle set of guidance, which combines engineering principles and prescribed or performance requirements, within agreed bounds, for those competent to use it properly, and
 - recognition that it was possible to design a fully performance based fire safety engineering approach, from first principles, although guidance for this would not be included in the Technical Handbooks, as it should only be undertaken by those competent in this field.
19. It was felt that there might be merit in some restructuring of the Technical Handbooks to stress the equal status of such alternative guidance.
20. The scope of the Technical Handbooks was also discussed. It was felt that this should be wide enough to avoid designers of relatively simple buildings having to employ fire safety specialists in order to ensure their designs fulfilled the functional standards. However it was also felt that there are existing sections currently within the Non-domestic Technical Handbook, which should not be used without sufficient specialist understanding and experience, in particular the annexes which cover hospitals and shopping centres. This material would be better published separately, not least so that it could be reviewed and updated as required. The annex covering residential care buildings should also be reviewed and might be best published separately.
21. It was suggested that there should be an additional Technical Handbook for simple domestic detached and semi-detached dwellings (up to 3 storeys). This would have to cover not only fire, but all sections of the functional standards to be really useful.

Recommendations 1 and 2

1. The current structure of mandatory functional standards supported with performance based or prescriptive guidance in the Technical Handbooks works and should be retained.

2. The Technical Handbooks should make clearer the status, functions and limitations of the guidance.

VERIFICATION OF FIRE SAFETY ENGINEERING

22. It was considered that if alternative guidance were to be highlighted, then there needs to be additional guidance given to verifiers on how to verify compliance with these different guidance sets.
- The very prescriptive guidance - should be capable of verification by all competent building standards professionals employed by verifiers without any particular specialist training.
 - The middle set of guidance - requires to be verified by building standards professionals who are at least as equally experienced as the design team, which might mean a degree of additional training for staff identified to undertake such verification, but should be within the competence of all verifying authorities.
 - The fully performance based fire safety engineering approach - must be handled by those competent to verify fire safety engineered designs.
23. It was estimated that there would be a limited number of designs which followed a fully performance based fire safety engineering approach, probably less than 20 each year, and therefore there was merit in considering some form of a national “hub” which could be responsible for the verification of such fully performance based fire safety engineering designs.
24. In coming to this conclusion the Review Panel had been assisted by having seen the final draft of the report [Feasibility of a Centralized Hub for Verification of Complex Fire Engineered Solutions in Scotland](#) undertaken for Building Standards Division by Brian Meacham.
25. In the longer term it might be possible to establish a system for Building Standard Certification of Design for Section 2: Fire, similar to that which has worked since 2005 for the Certification of Section 1: Structure. However, the shortage of professionals working in fire safety engineering means that this is at least five years away and probably much longer.

Recommendation 3

3. A better mechanism is required for the verification of fire safety engineering solutions for complex buildings and this might be in the form of a national “hub” to verify such applications.

26. Turning to the specific details of the functional standards and the current guidance in the Technical Handbooks the Review Panel identified three areas which need some revision and much of the time of the Review group was spent considering these in some detail. The three areas were:

- External walls and cladding, a linked group of standards all related to the reaction of materials to fire and comprising:
 - Cavities (2.4)
 - Internal linings (2.5)
 - Spread to neighbouring buildings (2.6)
 - Spread on external walls (2.7)
- Escape (2.9).
- Automatic fire suppression systems (2.15).

EXTERNAL WALLS AND CLADDING

27. Although the functional standards remain fundamentally correct there was an identified need for minor changes to the wording for “Cavities” (2.4), to close a potential loop hole which is very occasionally being exploited around the words “unseen” and “concealed”. One solution which might be considered is to use of the word “cavity” itself. It was also considered worth reviewing the functional standard for “Spread on External Walls” (2.7) to see if the wording should be modified to specifically include “rate of spread”.
28. Considering the guidance within the Technical Handbooks it was agreed that there was no longer the need to retain both British Standards and European Harmonised tests in respect of “reaction to fire” in the guidance. When first published in 2004 an annex (annex 2.B in Domestic and annex 2.E in Non-domestic) had to be included to relate classes of “reaction to fire” performance in terms of both sets of standards. This is no longer necessary and does mean that some of the British Standard tests are still being used to assess materials, when the European Harmonised tests offer a better and more cohesive structure for testing “reaction to fire”. In coming to this decision and considering the applicability of the current “reaction to fire” tests cited in the Technical Handbooks the Review Panel had been assisted by having seen the final draft of the [Research on Regulatory Appropriateness of Currently Cited Reaction to Fire Tests](#) in Technical Handbook – Section 2: Fire – Standards 2.4 – 2.7. undertaken for Building Standards Division by Brian Meacham.
29. The Review Panel recognised that consideration would have to be given to those products, which are approved under the currently cited British Standard “reaction to fire” test methods, but which have not been tested under the applicable European Harmonised “reaction to fire” test methods. Therefore such a change needs to be signalled to Industry as soon as possible and careful thought given to the possible need for a transition period, possibly say two years.
30. One benefit of only using the European Harmonised tests would be that this annex with the comparison table on “reaction to fire” for standards 2.4-2.7 would no longer be required. Instead the test classes could be cited directly in the relevant parts of the guidance. The specific classes denominators (A, A, B etc.) could be used instead of more generic nomenclature (low risk, medium risk, etc.).
31. If the principle of having alternative guidance for compliance was adopted then for the prescriptive set of guidance, available for all to use, the following changes would also be made:
 - In the guidance on “Cavities (2.4)” the guidance requires the use of A2 or better products under the Harmonised European reaction to fire test classes. This will have the consequence of reducing the distance between cavities barriers in cavities where there is category B material exposed from 20m to 10m.
 - In “Spread on external walls” (2.7) the current table 2.9 in the Non-domestic Technical Handbook, and the relevant sections in Domestic, would now change

so that in any building with a storey at over 11m above the ground it would require A2 or better.

- Further, for all entertainment and assembly buildings, residential care homes and hospitals it should only be A2 or better at any height.
- The requirement on insulation in high rise buildings (under 2.4.4 / 2.7.1 in the domestic and 2.4.6 / 2.7.2 Non-domestic Technical Handbooks) would be retained and take effect from 11m, rather than 18m.

32. The new 11m height is related to the height which might be able to be covered by a ground mounted water jet from fire-fighting operations.

33. The alternative guidance would still permit compliance with the functional standards to be shown by use of the tests set out in BS8414 (and BR135) as at present. In this manner innovation would still be possible, but the onus and expense of proving compliance would lie with the design team.

Recommendation 4

4. Changes are needed to the simple guidance on external cladding, cavities and fire spread on external walls (2.4 – 2.7):

4.1 Any building with a storey at over 11m above the ground should require A2 or better.

4.2 All entertainment and assembly buildings, residential care homes and hospital of any height should also be A2 or better.

4.3 BS8414 (and BR135) would remain as an alternative method of providing evidence to show compliance.

4.4 It is unhelpful and unnecessary to retain the British Standards as well as the European Standards in the guidance for “reaction to fire” tests.

ESCAPE

34. The Review Panel were unanimous that the strategy of “stay put / defend in place” should remain as the basis for the guidance in the Domestic Technical Handbook. It has worked well and, provided its limitations are fully understood and there is the possibility of total evacuation should that becomes necessary, it remains safe.
35. However in the light of the Grenfell Tower tragedy the Review Panel considered if there were any additional requirements which should form part of the guidance within the Technical Handbook for domestic buildings.
36. On the need for additional stairways there was no consensus amongst the Review Panel members. However the view of the chair, which was endorsed by all members of the international sub-group, was that there was a need to require at least two stairways in high rise domestic buildings with a storey at a height of 18m. This is firstly to provide an alternative in case of the failure of the first stairway and secondly to provide a route for escape if the other stairway is being used for fire-fighting operations. The height of 18m is currently used with in the Technical Handbooks and it was considered sensible to retain it as it is well known and relates to the ability of the fire service to intervene if absolutely necessary through the use of high reach appliances.
37. The introduction of such new guidance should not be taken to indicate that the Review Panel considered that existing high domestic buildings with a single stairway were unsafe. It was simply the intention to ensure future buildings were even safer.
38. The Review Panel were unanimous in supporting the suggestion that to assist in full evacuation, in the unlikely event that this becomes necessary, domestic buildings with a storey at over 18m should be required to install an evacuation sounders in each flat. These would be activated by a “fireman’s switch” at ground level.
39. It was also considered that due to the technical complexity of designing, installing and maintaining pressurised stairways this option should be removed from the guidance within the Technical Handbooks. This would not prevent their use as part of a design which showed compliance using the performance based fire safety engineering approach.

Recommendation 5

5. Changes are needed to the simple guidance on Escape (2.9). In domestic buildings over 18m there should be:

5.1 Two stairways.

5.2 Fire service activated evacuation sounders in each floor.

AUTOMATIC FIRE SUPPRESSION SYSTEMS

40. The Review Panel did not achieve complete agreement on what changes should be made to the mandatory requirement for the installation of automatic fire suppression systems (standard 2.15). However they did agree a series of principles which should underlie any decision to expand the requirement to further building types. These were that decisions should:
- be evidence based, using fire statistics and recognising continuing demographic and social changes
 - consider the cost-effectiveness of such requirements
 - recognise the public desire for action after Grenfell, and
 - learn from the Welsh experience of a recent mandatory requirement for automatic fire suppression systems in domestic buildings.
41. The Review Panel members were unanimous that the following groups should be required to install automatic fire suppression systems:
- Houses in Multiple Occupation (HMOs) used for “care” 24/7, which will necessitate a very careful definition of “care” linked to Care Commission definitions, and
 - large HMOs (10 or more residents).
42. It was agreed that flats should be included on the list of required building groups, provided the installation costs kept at the lower end of the scale (i.e. simpler installations).
43. It was agreed that single detached dwellings, should not be included on the list of required groups.
44. It was also agreed that there should be clarification over student flats and that those of the “cluster type” (which are by definition HMOs) should be defined as domestic and not residential.
45. The Review Panel felt it was important that the provision of automatic fire suppression systems was never seen as a compensation (or “trade-off”) for a reduction in the number of stairs or a lower fire safety performance of the cladding, unless this is part of a fully performance based fire safety engineering approach as outlined earlier.
46. The Review Panel also felt it was important to integrate any extra requirements for automatic fire suppression systems completely into the existing building standards system. Therefore it was preferable to do so through amendments to the existing Statutory Instruments rather than through a separate parallel piece of primary legislation.

Recommendation 6

6. The requirement for Automatic fire suppression systems (2.15) should be extended to some additional building groups:

6.1 HMOs used for “care” 24/7 and HMOs with 10 or more residents.

6.2 Flats provided it can be done with simpler installations.

6.3 Single detached dwellings should not be included.

CONCLUSIONS AND RECOMMENDATIONS

47. The Review Panel worked to ensure this report would be available to support a consultation on their conclusions in the summer of 2018. They also expressed their willingness to reconvene to consider the responses to this consultation and any additional issues which are raised, or which result from the Grenfell Inquiry.
48. The principal and recommendations are:
- 1) The current structure of mandatory functional standards supported with performance based or prescriptive guidance in the Technical Handbooks works and should be retained.
 - 2) The Technical Handbooks should make clearer the status, functions and limitations of the guidance.
 - 3) A better mechanism is required for the verification of fire safety engineering solutions for complex buildings and this might be in the form of a national “hub” to verify such applications.
 - 4) Changes are needed to the simple guidance on external cladding, cavities and fire spread on external walls (2.4 - 2.7):
 - 4.1 Any building with a storey at over 11m above the ground should require A2 or better.
 - 4.2 All entertainment and assembly buildings, residential care homes and hospitals of any height should also only be A2 or better.
 - 4.3 BS8414 (and BR135) would remain as an alternative method of providing evidence to show compliance.
 - 4.4 It is unhelpful and unnecessary to retain the British Standards as well as the European Standards in the guidance for “reaction to fire” tests.
 - 5) Changes are needed to the simple guidance on Escape (2.9). In domestic buildings over 18m there should be:
 - 5.1 Two stairways.
 - 5.2 Fire service activated evacuation sounders in each flat.
 - 6) The requirement for automatic fire suppression systems (2.15) should be extended to some additional building groups:
 - 6.1 HMOs used for “care” 24/7 and HMOs with 10 or more residents.
 - 6.2 Flats provided it can be done with simpler installations.
 - 6.3 Single detached dwellings should not be included.

Annex 1: Membership of the Review Panel

Paul Stollard, Chair

Sam Allwinkle, Professor Emeritus, Edinburgh Napier University,
(representing Chartered Institution of Architectural Technologists) (meetings 1 & 2)

Luke Bisby, Professor of Fire and Structures and Head of Research
Institute, Edinburgh University

Colin Blick, Building Standards Technical Manager, Welsh Government

Stewart Dalgarno, Industry Leadership Group Member & Chair of Building Regulations
Work Group, Construction Scotland (meetings 2 & 3)

Damien Fairley, Technical Officer for Part E – Fire Safety of the Northern Ireland Building
Regulations

Stephen Good, Chief Executive, Construction Scotland Innovation Centre (substituting for
Stewart Dalgarno at meeting 1)

Dave Latto, Group Manager, Fire Investigation/Fire Engineering, Scottish Fire and Rescue
Service

Alan McAulay, Building Standards Team Leader, South Lanarkshire Council (representing
Local Authority Building Standards Scotland) (meetings 1 & 3)

Keith McGillivray, Chief Executive, British Automatic Fire Sprinkler Association

Debbie Smith, Managing Director, Fire Sciences and Building Products
BRE Global

Colin Todd, Managing Director, C.S. Todd & Associates Ltd

Mike Wood, Chairman, Passive Fire Protection Federation (meetings 1 & 2)

International Members

Brian Ashe, Australian Building Control Board, Australia

Brian Meacham, Worcester Polytechnic Institute, (from 1/1/2018 Meacham Associates),
USA

Rainer Mikulits, Austrian Institute of Construction Engineering, Austria (meetings 1 & 3)

IJsbrand van Straalen, Dutch research organization TNO

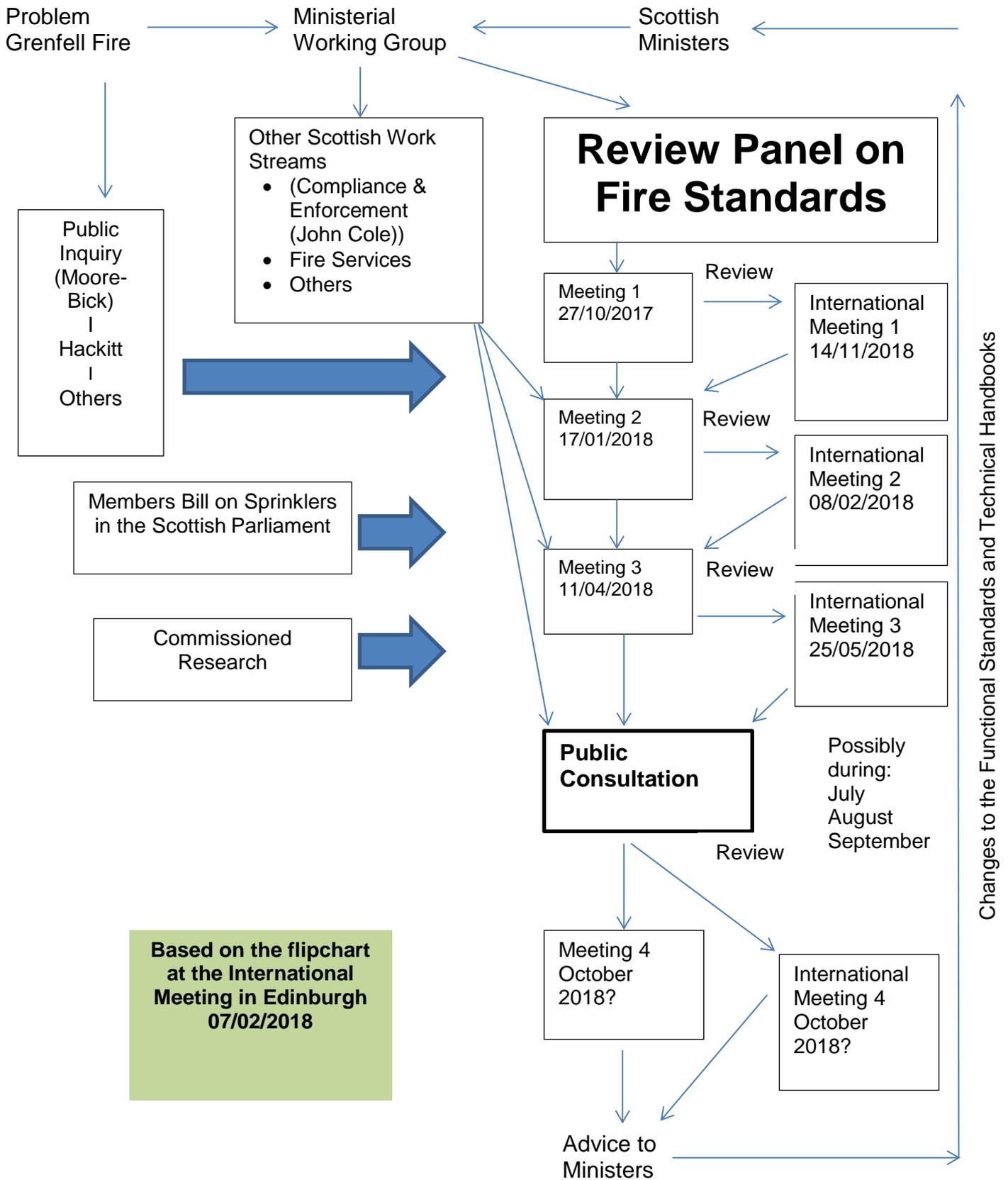
Scope

1. To review the standards and guidance for high rise domestic buildings and high rise residential buildings. A high rise building means a building with any storey at a height of more than 18 metres above the ground. A domestic building means a dwelling or dwellings and any common areas associated with a dwelling. A residential building means a non-domestic building having sleeping accommodation.
2. The primary focus for these high rise buildings is on standards 2.4 to 2.9 and standard 2.15. These standards cover cavities, internal linings, spread to neighbouring buildings, spread on external walls, spread from neighbouring buildings, escape and automatic life safety fire suppression systems.
3. Finally, the standards and guidance for the other building types (including low rise buildings) will be reviewed in light of any changes to standards or guidance from 1 or 2 above.

Remit

4. On the basis of the above, the review should consider Section 2: Fire of the Technical Handbooks in light of any evidence emerging from the Grenfell Tower fire in London on 14th June 2017. It should look at the appropriateness of the current standards and guidance, the relevance of BS/EU fire tests and provide opinion on any changes.
5. A questionnaire will be developed for international comparison of building standards relating to fire, associated guidance and trigger points. Particular focus will be on external wall cladding, fire tests and sprinkler provision.
6. Any issues raised by the Panel on the operation of the building standards system or the competency of those involved in the procurement, design, construction or verification of projects should be passed to the Building Regulation Compliance and Enforcement Review, which is running concurrently.
7. The scope and programme of the Panel will be reviewed as evidence emerges from the Grenfell Tower Inquiry and the Independent Review of Building Regulations in England.

FIGURE 1: RESEARCH METHODOLOGY & PROCESS





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