



# FQ0670/11

## Report on ISO TC 92 SC4 Meeting, April 2011

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# Report on ISO TC 92 SC4 Meeting, April 2011

## 1. CLIENTS

- Foundation for Research Science and Technology
- BRANZ
- Department of Building and Housing
- Standards New Zealand

## 2. BACKGROUND

The purpose of this report is to provide information to BRANZ, Standards New Zealand (SNZ) and the Department of Building and Housing (DBH) about the activities of ISO TC92 SC4 (fire safety engineering) and to serve as a record of attendance at ISO TC 92 SC4 during the week of April 2 – 7, 2011 in Paris, France.

Colleen Wade attended the ISO TC92 Subcommittee 4 and TC92 plenary meetings during the week representing SNZ.

### 2.1 Background for attendance at meeting and representation on committee

The Foundation for Research Science and Technology and BRANZ are funding research to develop a risk-based design fire tool in recognition of the need for the development and support of design methodologies that will lead to greater robustness and confidence in fire safety engineering design. The current review of the Building Code by DBH may also lead to significant changes to how fire safety engineering is conducted in New Zealand. The possible adoption of several ISO TC92 produced documents is also being considered as part of a fire safety engineering framework.

ISO TC92 SC4 is an International Standards Organisation sub-committee that is responsible for developing international standards and guidance documents related to fire safety engineering. New Zealand participation in ISO TC92 SC4 and its associated working groups provides an important opportunity to ensure the New Zealand research, and new Building Code changes benefit from international linkages by working closely with other international experts in this field as well as providing an opportunity to learn from and influence international directions in fire safety engineering.

### 2.2 Structure of ISO TC 92 SC4


This sub-committee consists of the main plenary group supported by a number of working groups and task groups. Most of the actual work done takes place in the working and task groups.

The meetings attended included the following:

- Task Group 1 (convenors meeting)
- Working Group WG1 (general principles and performance concepts);
- Working Group WG6 (design fires);
- Working Group WG7 (verification and validation of calculation methods);
- Working Group WG9 (calculation methods);

  
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- Working Group WG10 (fire risk assessment);
- Working Group WG11 (behaviour and movement of people);
- Working Group WG12 (fire performance of structures);
- Joint meeting with SC1 on data requirements for SC4
- Joint meeting with SC3 on life safety criteria based on toxic hazard
- SC4 plenary session
- TC92 plenary session

The various working groups are currently drafting a range of documents, some of which will ultimately become international standards. Depending on the final intended application of a document and its stage of development the following abbreviated notations are used in identifying relevant documents:

PWI	preliminary work item
NP	approved work item
WD	working draft
CD	committee draft
DIS	draft international standard
FDIS	final draft international standard
DTS	draft technical specification
TS	technical specification
TR	technical report
IS	international standard

A technical specification (ISO/TS) is reviewed/balloted after three years in order to decide if it will be confirmed for a further three years or revised to become an international standard or be withdrawn. It is now possible for a TS to have an indefinite life. Final outputs are either technical reports or international standards, with a strong preference for the latter wherever possible.

### 3. ACTIVITIES

#### 3.1 Task Group TG1 (meeting of convenors)

**Convenor: J Kruppa, France.**

**Meeting No. 24 (3 April 2011, 9.30 am)**

This was a general meeting of working group convenors to liaise on the program for the week and brief each other on common issues and items to be discussed in the working groups during the week.

- Current membership includes 16 O-members and 25 p-members.

  
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- The Japanese delegation were not able to attend the meetings including the Dr Tanaka and Dr Harada (working group convenors).
- Participants are reminded to check the ISO live-link website for the official SC4 membership list to ensure its accuracy and currency.
- The Working Group convenors described their proposed work group activity to be discussed during the week.
- WG1 meeting cancelled due to Dr Tanaka of Japan unable to attend. Dr Tanaka has requested information from the various countries on the functional requirements used within each country.
- Dr Benichou will be acting convenor the WG9 meeting in the absence of Dr Harada.
- TS 24679 Performance of Structures in Fire was published on 15<sup>th</sup> March 2011.
- Voting for new work item NP29761 for occupant behavioural scenarios closed on 25<sup>th</sup> March 2011.
- Voting for DTR 10796 example applications of ISO 16730 closed on 31<sup>st</sup> March 2011.
- The series of technical reports 13387 needs explanation to the users of which part or parts have been superseded by other newer documents. This was referred to WG1 for consideration.
- SC1/SC4 joint meeting – inputs from SC4WG7 and SC4WG6 needed at this meeting. Send WG6 draft data document to SC1.
- SC2/SC4 will discuss template/format for data elements.
- TPMG meeting will take place on Thursday evening. There will be discussion on the business plan.
- There is a French proposal for working group to develop a standardized way for structuring and collecting statistical data on fire incidents. This is to be considered by TPMG.
- There is a CIBW14 meeting on Monday 11<sup>th</sup> April at AFNOR.
- It is proposed for a resolution to be made from SC4 to TC92 for new chairman for SC4 being Dr N Benichou.
- Official invitations for the next meeting in Ottawa in Canada will be sent within the next few weeks. Meeting date to be 17-21 October 2011. There is an invitation from Greece for the April 2012 meeting.

### **3.2 Working Group WG1 (general principles and performance concepts)**


**Convenor: Prof. Takeyoshi Tanaka, Japan**

**Meeting No. 5 (6 April 2011, 9.00am)**

This meeting was cancelled since Prof. Tanaka was unable to be at the meeting as a result of recent events in Japan.

  
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### 3.3 Working Group WG6 (design fire scenarios and design fires)

**Convenor:** C. Wade, New Zealand

**Meeting No. 23 (5 April 2011, 8.30am)**

This working group has previously produced a Technical Report ISO/TR 13387-2 Fire Safety Engineering - Part 2: Design fire scenarios and design fires, as part of the suite of ISO/TR 13387 reports.

More recently this has been supported by Technical Specification ISO/TS 16733 "Fire safety engineering – selection of design fire scenarios and design fires" published on the 7 July 2006. Two examples of the selection of design fire scenarios are currently included in the technical specification: for a multipurpose covered stadium, and for a warehouse containing a single commodity.

The guidance provided in ISO/TS 16733 is of a general nature and takes users through the process (steps) of identifying design fire scenarios and their characteristics. It does not give any detailed specifications (i.e. numerical values) for design fires to be used for any particular occupancy. The technical specification is written with a deterministic assessment in mind and therefore is aimed at providing guidance on how to reduce a very large number of possible fire scenarios down to a manageably small set of design fire scenarios (scenario clusters) that can be used in an analysis.

**Work item:** PWI 29241 Examples

WG6 is in the process of developing two examples of the selection of design fires characteristics to accompany the design fire scenarios given in Annex B and Annex C of ISO TS 16733. The first example is for a multi-purpose covered stadium and the second for a warehouse with a single commodity. The intention is to follow the subsections of ISO TS 16733 to illustrate its use.

At the current time only one of the examples is active, the covered stadium. Work on the warehouse example has been deferred because the project leader considered it was necessary to first address matters relating to use of a safety concept before the worked example could be advanced.


Since the previous meeting, C. Wade had revised the stadium example and distributed this to the task group and working group members. Following discussion at the last meeting and experience in development of the example thus far, the project leader felt that deficiencies in the process described in TS16733 were apparent when applied to this example. The difficulty is related to the use of probability as part of the scenario selection process. The current process asks for consequence and probability to be quantified, and risk ranking undertaken, however the assignment of probabilities may be very approximate since this is only for the initial scenario selection and not as a full risk assessment. Unfortunately if the probability value selected is too low, then there is a danger of some scenarios being dropped that perhaps should not be due to a low ranking.

It was proposed that scenarios should perhaps be ranked based more on consequence, with their probability introduced as part of the actual risk assessment procedure rather than at the scenario selection stage. This may address the problem of prematurely excluding system failure scenarios at this early time of identifying scenarios for analysis.

There was not uniform agreement on whether the process described in TS16733 should be changed, however it was agreed that a task group comprising C Wade, J

  
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Hall, D Nilsson, R Fahy, A Nazih and N Benichou would consider such a change. The task group members were invited to submit any contributions to C Wade by the end of May, and then C Wade would compile a revised Technical Specification for redistribution to the task group by the end of June. A revised draft for the example and possibly the TS could then be discussed at the October meeting.

J Hall stated it was important that any change did not result in losing the ability to capture common cause failures. He also thought there could be some language in the SFPE fire risk assessment guide that might be helpful.

D Nilsson also offered to trial any revised procedure with fire safety engineering students at Lund University in order to gain additional experience and insight into the process. He also suggested that it would be easier to initially work with the example rather than the actual TS when considering what changes might be needed.

A wider group of people may also be consulted including D. Gann, J Weise, T Tanaka, R Alpert and J Mehaffey.

### **SC3/SC4 Work Items:**

The suggested work item relating to a classification approach for assessing toxic hazard of finished products in buildings is not adequately developed for action at this stage. The item was discussed at the SC3/SC4 joint meeting and it may be that SC3 will proceed with some of the work.

The proposal to extend the covered stadium example to include an evaluation of tenability of the fire effluent was discussed. Work might begin on the example following the completion of the WG6 and WG11 examples. WG6 had previously requested SC4 to consider which work group should host this potential work item in the future.

### **Data Requirements for WG6:**

A draft table containing a list of data requirements for WG6 was presented by C Wade the project leader and discussed. The table is intended to form an annex to TS 16733. Further contributions were invited and the document will be re-circulated to WG6 prior to the next meeting. Suggestions for further additions to the data table included adding an entry for thermal properties of linings, and a row for building geometry and features (data from design).

**From WG10, Preliminary New Work Item:** – Dr Hall described a draft of a document (WG10N138) on a simplified approach to scenario specification and fire frequency estimation. It is intended to assist countries with a limited amount of fire incident data who wish to utilise a larger dataset such as fire data from the USA. It was agreed that this be proposed to SC4 as a new preliminary work item within WG6 with J Hall as project leader, and part of a task group including C Wade and N Benichou and possibly others to be determined.

The next meeting of SC4/WG6 will be on Wednesday October 19<sup>th</sup> at 9.00 am.

  
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### 3.4 Working Group WG7 (verification and validation of calculation methods)

**Convenor: Mr Dieter Brein, Germany**

**Meeting No. 23 (3 April 2011, 2.00pm)**

**Main Document:** ISO 16730 Fire safety engineering -- Assessment, verification and validation of calculation methods (Published in July 2008).

ISO 16730:2008 provides a framework for assessment, verification and validation of all types of calculation methods used as tools for fire safety engineering. It does not address specific fire models, but is intended to be applicable to both analytical models and complex numerical models that are addressed as calculation methods in the context of this International Standard. It is not a step-by-step procedure, but does describe techniques for detecting errors and finding limitations in a calculation method.

ISO 16730:2008 includes the following:

- a process to ensure that the equations and calculation methods are implemented correctly (verification) and that the calculation method being considered is solving the appropriate problem (validation);
- requirements for documentation to demonstrate the adequacy of the scientific and technical basis of a calculation method;
- requirements for data against which a calculation method's predicted results shall be checked;
- guidance on use of ISO 16730:2008 by developers and/or users of calculation methods, and by those assessing the results obtained by using calculation methods.

#### **Work item: ISO/NP TS 13447 Guidance for the use of fire zone models**

This project with C Wade as task leader and principal author is underway in order to address particular characteristics of zone models with special emphasis on ranges of applicability, limitations etc.

A revised version of the document was provided by C Wade. D Brein suggested adding an introduction at the start of section 8 giving advice to users regarding the application of the guidance. Also at the end of the section, to give advice to the users outlining a checklist for topics 8.1 to 8.9 that asks the user to check if these effects might have an influence on the real world scenario and to consider if these effects are covered in the calculation method to be used. If there are effects that are present but are of minor importance then engineering judgement may determine that the method could still be used or not.

There was a request to provide guidance on when radiation feedback effects can be ignored. In section 8.7, J Hall suggests some clarification and for the user to check the technical documentation of the relevant model.

I L'hoir volunteered to provide additional text regarding sect 5.4.3 relating to vents, and also for section 6.3 on openings that highlights models that can cover consideration of pressurized spaces. She will send suggested wording within two months.

  
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C Wade to incorporate changes to section 8 and prepare revised version for the next meeting. D Brein suggests that after Ottawa meeting the draft can be sent out for balloting as a draft technical specification.

**Work item: PWI 24677 Data for validation of calculation methods**

There was no discussion of note on this item.

**Work item: ISO/NP TR 10796- 1 through 4:**

4 examples on calculation methods are developed to demonstrate the applicability of procedures described in ISO 16730 on distinct calculation methods for several types of physics based mathematical models (zone model “CFAST”, CFD model “ISIS”, structural model “WALL2D” on predicting the fire performance of wood-framed wall assemblies) as well as for equation-based calculation methods (egress model “EXIT89”).

The results of the balloting of these examples was discussed at length. There were 19 positive votes and 1 disapproval vote by New Zealand. It was noted that the nature of the New Zealand comments had been debated at previous meetings and concerned the fact that the examples described proprietary models and if published by ISO, they were likely to be construed as being endorsed by ISO.

N Benichou said it was a benefit if it can be shown that the process of the standard can be applied to different types of model.

J Hall did not agree with New Zealand comments that this represented an endorsement by ISO of any particular model. He does not think that the comment warrants a change.

J Kruppa said it was planned to have a disclaimer at the beginning. The purpose was only to show the process is suitable, not to check if the validation is actually correct or adequate for the model. He also said the examples must not be used to advertise a particular model, and supported less prominence be given to the model name.

D Brein showed the wording of the disclaimer and proposed to add further explanation to the introduction of each example.

M Dey suggested adding a specific statement that ISO is not endorsing this particular model.

J Hall would like to see a disclaimer that is more obviously targeted at computer models. It should clarify what the purpose of the document is – a demonstration of the ISO process, it is not an actual Validation & Verification for the particular model.

J Gross agrees there would be merit in using a disclaimer statement that can be used in different documents.

C Wade suggested adding a second paragraph to the disclaimer that was targeted at the subject model and clearly explaining what the purpose is, and is not, would be quite helpful.

D Brien proposed that the project leaders for the examples meet to edit the examples and reduce the prominence of the model names.

J Hall said that if a modified disclaimer was included, and reduced emphasis on the model name then that should be adequate, given that the name of the model is not included in the title.

  
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D Brein summarised the action as amending the disclaimer, edit the documents and recirculate the documents again for the Ottawa meeting to discuss outcomes.

### **ICFMP International Collaborative Fire Modelling Project**

Dr Dey was invited to make a presentation on this project that evaluated a number of fire models for use in the nuclear power plant industry. He suggested adding to ISO 16730 some material related to carrying out blind exercises. There is a need to set up rules for how to do blind exercises. Different users may choose different inputs to a specific model and therefore introduce corresponding scatter in the results obtained using the model.

## **3.5 Working Group WG9 (calculation methods)**

**Acting-Convenor: Dr N Benichou, Canada.**

**Meeting No. 23 (6 April 2011, 1.30pm)**

The convenor, Dr K Harada was unable to be at the meeting due to recent events in Japan.

WG9 are preparing documents describing the use of specific calculation methods relating to various fire phenomena. Describing the limitations of calculations as well as the actual equations is seen to be important.

There are three relevant work items for WG9:

1. PWI 16737: a revision to ISO 16737 Fire safety engineering -- Requirements governing algebraic equations -- Vent flows
2. PWI 24678: for algebraic equations on flashover-related phenomena.
3. PWI 29763: for thermal radiation from pool fire flames.

**Work item: PWI 16737**

PWI 16737, revision of the International Standard ISO 16737:2006 "Fire safety engineering - Requirements governing algebraic equations - Vent flows".

Voting results 19/19 in favour.

**Work item: Revised PWI 24678**

Following discussion at the previous meeting, a revised document on requirements governing algebraic equations on flashover related phenomena was provided by Mr N Alvares (not present). At this time it is intended that this document be a technical report and not a standard.

**Work item: PWI 29763**

Mr A. Alvarez provided a revised draft for PWI 29763: Requirements governing thermal radiation from pool fire flames.

There were discussions regarding the applicability of the formula to non-hydrocarbon fuels. Revisions to the document were discussed and it was agreed that Mr Alvarez will continue and update the text by the end of June.

  
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### SC3/SC4 Joint Project List

A new work item will be commenced on flame spread algorithms with a task group comprising Dr Harada, C. Wade, Dr Ni and Dr Kim. There has been no action on this item to date.

## 3.6 Working Group WG10 (fire risk assessment)

**Convenor:** Dr. John Hall, NFPA, USA.

**Meeting No. 23 (5 October 2010, 1.30pm)**

This working group has previously prepared ISO/DIS 16732 guidance on risk assessment for use in fire safety engineering. This document has been published.

ISO/DIS 16732 provides the conceptual basis for fire risk assessment by stating the principles underlying the quantification and interpretation of fire-related risk. These fire risk principles apply to all fire-related phenomena and all end-use configurations, which means these principles can be applied to all types of fire scenarios.

**Work item:** PWI 12607

Dr Taveau gave an update on the example for a propane storage facility with an objective to reduce the probability of a BLEVE to an acceptable level. He described what changes were made but was unable to provide the revised document until it had been first reviewed by his company.

**Preliminary New Work Item:** Dr Hall described a draft of a document (WG10N138) on a simplified approach to scenario specification and fire frequency estimation. It is intended to assist countries with a limited amount of fire incident data who wish to utilise a larger dataset such as fire data from the USA. It was agreed that this be proposed to SC4 as a new work item within WG6 with J Hall as project leader, and part of a task group including C Wade and N Benichou and possibly others to be determined.

## 3.7 Working Group WG11 (Behaviour and movement of people)

**Convenor:** Rita Fahy, NFPA, USA

**Meeting No. 23 (4 April 2011, 1.30pm)**

**Work item:** ISO/CD TR 16738

WG11 is a work group concerned with behaviour and movement of people.

ISO/TR 16738 (ISO/TC 92/SC4 N515) Fire Safety Engineering – Evaluation of behaviour and movement of people was published in July 2009.

**Work item:** PWI 29761 Occupant behavioural scenarios

Dr Fahy described work done since the last meeting, including a comprehensive new example developed by Dr Robbins on developing occupant behavioural scenarios for a residential facility intended for an elderly population.

Dr Nilsson then described the work of the work group, and gave a presentation about fire safety design process. The task group felt that it would be beneficial to merge parts

  
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of the TS 16733 document with the new occupant behavioural material in order to clearly identify where the linkages between the WG6 and WG11 documents occur.

There was discussion about whether there should be two separate documents or a single WG6/WG11 document but no universal agreement was reached. However, there will be a merging initially as mentioned above but this is not necessarily how the final output will appear.

It was felt that further work on the examples at the moment was not a high priority and could wait until the task group developed a new version of their report.

### **3.8 Working Group WG12 (fire performance of structures)**

**Convenor: Dr Noureddine Benichou, NRC, Canada**

**Meeting No. 15 (7 April 2011, 9.00am)**

**Work item: ISO/WD 24679 Fire safety engineering – Performance of structures in fire**

This working group is currently engaged in the preparation of a technical specification for guidance on structures in fire for use by fire and structural engineers. The document TS 24679 has now been published as a Technical Specification.

Dr Kohno of Japan described the revised Japanese example of a case study of a 15 storey steel office building. It appeared that this example worked well following the procedures in TS 24679. It was agreed a further revision be done to get the example to be ready for balloting as a Technical Report.

Mr Ni of Tianjin Fire Research Institute, China presented the case study from China for an airport terminal. This is a 3 storey steel structure of 71,000 m<sup>2</sup> area and 22 m high. Two floors are above ground and one below. This example is also looking very good. There will be a period of 2 months for members to forward any further comments to Dr Benichou to pass to Mr Ni. The example will be revised again with the intention of it being ready for approval to be balloted as a Technical Report at the next meeting.

Dr Cooke noted that it will be important to say that the examples are applications and the data and methods used may be specific to individual countries and not universally applicable.


A French example of the design of an open car parking building following the procedures of TS 24679 by CTICM was presented. The car park is a 3-storey building, of which all façades are open, with about 520 car park spaces (130 spaces per level). Each car park place occupies an area of 2.5 m by 5.0 m. They consider the effect of a localised fire source using Hasemi's method (in Eurocode 1), as well as using a two-zone model. Scenarios using 1, 4 and 7 vehicles are used. For an open car park it is assumed that the fire brigades will be able to more easily find the source of the fire and restrict the spread of the fire beyond ~7 cars. In closed car parks, the number of cars involved could be much larger.

The example from New Zealand was not presented at this meeting since the project leader was not present.

Dr J Gross gave a brief presentation on a new facility at NIST for testing real scale structural systems to fire. It will include a 60 x 90 ft strong floor, a 60 x 30 ft strong wall, a 45 x 50 ft hood with emission control and capability for a 20MW fire. It will include a basement floor enabling the use of hydraulic jacks etc. There is a requirement for there

  
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to be no visible smoke in the building emissions. The development is to be a public-private partnership. The facility should allow a 2 storey building with 2x3 bays to be loaded and subjected to fire.

### 3.9 Joint Meeting SC1 and SC4, Data

**Convenor: Dr K Yoshida (5 April 2011, 5.00pm)**

SC1 are revising an old ISO/TR 3814 document relating to standard tests for measuring reaction to fire properties. It gives a useful summary or overview of application and suitability of various test methods.

ISO/TR 17252 is a more detailed document, discussing the applicability of reaction to fire tests to fire modelling and fire safety engineering. SC1 is also looking to revise this document.

The data requirements for the SC4/WG9 document on plume calculations were displayed and it was shown where SC1 had provided additional details on suitable sources and test methods for the input data for the calculations.

SC4/WG6 also has a draft document for data needs, and C Wade is to provide this to SC1 for their input. There was also discussion on SC1 providing input to an example, and C Wade will provide a copy of the WG6 example on the development of design fires for a covered stadium.

### 3.10 Joint Meeting SC3/WG5 and SC4, Toxicity

**Convenor: Dr D Gann, NIST**

**Meeting No. 7 (4 April 2011, 10.30am)**

D. Gann summarised and updated the status of the list of potential new work items previously prepared for discussion and consideration by the various work groups in SC3 and SC4. The list is included as Appendix A of this report.

### 3.11 SC4 plenary session

**8 April, 9.00am**

**Chairman:** Dr Joël Kruppa

**Secretariat :** AFNOR – Mr Benoît Smerecki

Confirmation of a revised numbering system using the standard numbers and subsequent parts. Examples will be published as Part 2 for example.

Reminder of the obligation of p-members to vote on draft documents.

The working group convenor reports were presented at the plenary session.

It was stated by the ISO representative that Technical Reports should be re-confirmed each year.

A copy of the resolutions made by SC4 are given in Appendix B.

  
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Location and date of next meeting: Ottawa, Canada, October 17 – 21, 2011.

## 4. SUMMARY

This report summarises activity in ISO TC 92 SC4 on fire safety engineering as discussed at the April 2011 meeting in Paris, France.

  
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# APPENDIX A

## ISO/TC 92/SC 4 N535

### Candidate Work Items from Matrix for Use of Tenability and Smoke Toxic Potency Information in Fire Safety Engineering

RGG; revised from SC3 N142 March 12, 2010  
Revised April 29, 2010; revised February 13, 2011

#### SC3

1. Standard on requirements for large-scale test methods to represent toxic gas and smoke hazards in different fire scenarios. Document on scenarios for large-scale fire tests (**SC3 WG1**)

This International Standard will provide guidance for the set-up of large-scale fire tests which represent different well-defined fire scenarios, and presents guidance on the sampling of toxic gas and smoke hazards. It provides bases for comparing the results among different types and scales of such tests.

**Status:** The Project Leader status will be determined prior to the Paris meeting, and a successor identified if needed. Rough draft to be developed by SC3 and circulated to SC3 and SC4 (copy to SC1) for discussion in Ottawa (10/2011); **Action: Eric Guillaume/Richard Hull**

2. Normative documents on obtaining fire effluent data for finished products (**SC3 WG1**)
  - a. Standard for correlation of toxicity data among physical fire models and full-scale tests (**WD 29903**)

This International Standard will provide principles for characterizing the yields of toxic gases from a laboratory fire test and provides bases for comparing the results among different types and scales of such tests. This Standard also includes consideration of the uncertainties in the gas yield determinations. The combined uncertainty is a key factor in the ability to establish similarity or difference of test results. The sufficiency of the agreement between a bench-scale test and a real-scale test depends on the needed precision in the fire hazard or risk assessment. This is not covered in this Standard.

**Status:** Ballot for approval to register as a DIS underway, closing 4/5/2011. No action expected in Paris. **Action: Per Blomqvist**

- b. Bench-scale method for the determination of hazardous components of fire effluents (ISO/TS 19700; controlled atmosphere cone calorimeter)

ISO/TS 19700 describes a tube-furnace method for the generation of fire effluent for the identification and measurement of its constituent combustion products, in particular, the yields of toxic products under a range of fire decomposition conditions. The use of this apparatus is generally applicable to individual materials, to products that are layered such that the layering will not result in a significant change in product yields with time in real fires, i.e. to

  
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products where the upper surface does not provide major protection to the sub-layers. This method has been designed to provide data for input to hazard assessments and fire-safety engineering design calculations.

Interest has been expressed in SC1 WG5 and SC3 WG1 in using the controlled atmosphere cone calorimeter for this purpose.

**Status:** Completion of revised Rounds 1 and 2 of the round robin on ISO/TS 19700 scheduled by Paris meeting. **Action: Richard Hull**

Plan for a small symposium on the use of the controlled atmosphere cone calorimeter at the Ottawa meeting. **Action: Eric Guillaume & Stephen Grayson.**

3. Technical Report on the effect of combustion conditions on effluent components **(SC3 WG2)**

This document summarizes and interprets the findings of research on the variation of the yields of toxic compounds, visible smoke, and heat with combustion conditions, notably equivalence ratio and possible the chemical composition of the combustible.

**Status:** Compilation of sources of data for discussion in Ottawa. **Action: Not yet assigned.**

4. International Standard on calculation of wall losses of gases and smoke **(SC3 WGx)**

This document would include the published methods for assessing the decrease in gas and smoke concentrations as a function of distance from the fire. Non-normative annexes would compile the results of tests of wall losses.

**Status:** No action yet.

5. Examples of calculations of FED and ASET **(SC3 WG5)**

This Annex to **ISO 13571** or an SC3/SC4 document provides examples of the use of the equations within the Standard.

**Status:** SC3 WG5 and SC4 WG11 to compile previous examples supplied by Experts. **Action: Examples from Guillaume and Su; for discussion in Paris (4/2011).**

6. Technical Report on the sub-incapacitating effects of fire effluent **(SC3 WG5)**


This document compiles and interprets the published literature on the effects of toxic gases, visible smoke, and heat at levels below those that lead to incapacitation.

**Status:** Solicit person to compile data from, e.g., AEGL documents. **Action: Dick Gann.**

7. Compilation of limiting hazard by product type and fire scenario **(SC3 WG5)**

  
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**Status:** No action yet.

8. Possible additional document on safety of emergency responders.
9. Default values for input source terms for the design parameters.  
JK – difficult, maybe not give numbers but describe process.

#### **SC4**

1. Include consideration of tenability conditions in revisions of **ISO/TS 16733 (SC4 WG6) and ISO/TS 16732 (SC4 WG10)**

For both design fire scenarios and risk assessment, this would be in the form of new examples. In these examples, assumptions on the effects of delay in evacuation or incapacitation (before or during evacuation) would be included.

**Status:** Add to the covered stadium example being developed in SC4 WG6 the parameters necessary for tracking changes in tenability. Input will be needed from SC4 WG11. Draft Statement of Work developed. **Action:** Colleen Wade and Dick Gann. For discussion at the Paris meeting.

2. Normative document on effects of smoke and toxicants on human behaviour and judgment and thus on time required for escape; or non-normative document on what to do if no information is available (**SC4 WG11**)

This would be a follow-on to **ISO/DTR 16738** in **SC4 WG11**. SC3 Task 6 would develop guidance on changes in people as a result of effluent exposure. This would include effects of these changes on movement speed and choices. An annex could include treatment of statistical distribution of behavioural response. This may require pre-normative work, such as a parametric study of a design fire, behavioural scenarios, and different EC<sub>50</sub> values to examine the effect on movement speed, etc.

**Status:** No action yet, awaiting results of SC3 Task 6.

3. Include consideration of fire effects on people in document on selection and implementation of behavioural scenarios (**SC4 WG11**)

This would be an extension of **WD 29761**.

**Status:** Include in discussion of 29761 by the Paris meeting. **Action:** Rita Fahy, Dick Gann.

4. Technical Report on relative importance of various fire scenarios, including guidance for jurisdictions that do not have fire incidence data compilations (**SC4 WG 10**)

This document would guide authorities on how to weight fire scenarios, including the likelihood that people would be moving within the occupancy.

**Status:** John Hall has started a draft of this for SC4 WG10 consideration. Use U.S. data as a starting point, then adjust for broader cultures and demographics. **Action:** John Hall.

  
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5. International Standard(s) on flame spread algorithms **(SC4 WG9)**

This Standard would establish criteria for equations and software for calculating fire growth, including changes in equivalence ratio that might affect combustion product yields, as in Item 3 under SC3.

**Status:** To be developed in SC4 WG9 as time becomes available. **Action:** Kazunori Harada.

6. International Standard for fire growth capability in zone and CFD models **(SC4 WG7)**

This Standard would establish criteria for equations for validating effluent generation and transport models, including changes in equivalence ratio that might affect combustion product yields, as in Item 3 under SC3. Some application in 16733 in SC4 WG6.

**Status:** Could be in examples of application of ISO/TS 16730. **Action:** Dieter Brein.

7. International Standard on transport and losses of effluent and effluent components in zone and CFD models **(SC4 WG7)**, using output from Item 4 under SC3. SC4 WD7 would assist in the documentation of the results of the SC3 task and their introduction into fire models.

**Status:** Awaiting Task 4 document from SC3. Criteria for validation could then be developed in SC4 WG7 and could be part of an example in 16733.

8. Technical Specification on approach to grouping finished products by magnitude and nature of effluent potency **(SC3/SC4 WG6)**

The purpose of this document is to support the inclusion of real combustibles in engineering calculations and to provide a basis for efficient calculation of effluent potency contribution. One would use a generic average value unless a combustible item is distinctive, based on, e.g., mass of the item, burning rate, toxic product yields, other products burning at the same time. Consider using a probability distribution of product characteristics and, e.g., a 99 % cutoff.

**Status:** Colleen Wade, John Hall, and Dick Gann to coordinate. Gann sent a prior paper on this to Wade, Hall, and Kruppa.

9. Guide to estimating tenability. **(SC3/SC4 WG1)**

This would be a guide to using all the above documents, along with other appropriate TC92 documents, for estimation of whether people would be able to escape from a fire. It would build on the outline in Clause 11 of ISO 23932.

**Status:** Could be a joint project between SC3 WG5 and SC4 WG1. No action yet.

  
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**APPENDIX B**  
**ISO/TC 92/SC 4 "FIRE SAFETY ENGINEERING"**  
**RESOLUTIONS**  
**PARIS, FRANCE**  
**8TH APRIL 2011**

**Resolution SC4 N210 – Paris 1, 11/04/08 – ISO/TR 13387-1 to 8 submitted to the Systematic Review Balloting**

As proposed by TG 1 in document SC4 N638, based on the voting results of the systematic Review Balloting,

ISO/TC 92/SC 4 confirms the eight parts of TR 13387, while noting that some parts, already replaced by new documents, could be withdrawn in order to keep full coherence of this Technical Report.

Furthermore, SC 4 agrees to prepare a short document (for instance a Technical Report) for SC4 document users to indicate the interactions between the various SC 4 documents, as TR 13387 provided when originally drafted, emphasizing which documents have been updated and explaining which documents should be used for a FSE assessment according to ISO 23932 General Principles. WG 1 could prepare this type of document.

Additionally, to permit the withdrawal of TR 13387 in the near future, SC 4 could also start producing new documents on TR 13387 aspects not yet covered by new SC4 documents.

**Resolution SC4 N211 – Paris 2, 11/04/08 – Addition to the SC4 work programme of a Preliminary New Work Item**

As proposed by WG 6 and WG10 in document SC4 N639,

ISO/TC 92/SC 4 agrees to add to the SC4 work programme a Preliminary New Work Item within WG6 to prepare a document (See document SC4 N651) on a simplified approach to scenario specification and fire frequency estimation with John HALL as Project Leader.

**Resolution SC4 N212 – Paris 3, 11/04/08 – Publication of ISO 16737 (Revision of ISO 16737:2006)**

According to ISO/IEC Directives, Part 1, Subclause 2.6.4 (b),

Regarding the positive results of the ISO/DIS 16737 "Fire safety engineering –

  
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Requirements governing algebraic formulas – Vent flows” enquiry and,

As proposed by WG9 in document SC4 N641,

SC4 agrees to send the document to ISO/CS for publication after a checking of the English by John GROSS and of some technical points by Japanese experts.

**Resolution SC4 N213 – Paris 4, 11/04/08 – Launch the FDIS ballot for ISO/DIS 16732**

As proposed by WG10 in document SC4 N642,

ISO/TC 92/SC 4 agrees to launch the FDIS 16732 ballot, which will be separated into Part 1-  
-General and Part 2—Example Application to Offices, with final drafts to be provided to the  
SC4 Secretary by 30<sup>th</sup> April 2011.

**Resolution SC4 N214 – Paris 5, 11/04/08 – SC 4 Chairmanship**

As proposed by AFNOR and agreed by TG 1 in document SC4 N638,

ISO/TC 92/SC 4 agrees to appoint Nouredine BENICHOU as Chairman of SC4, for a period  
of three years starting in 2012.

**SC 4 asks TC 92 to confirm this appointment at its plenary meeting.**

  
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