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Interpretation of new test standards for fire resistance test

Nordtest Project No. 1655-03

Nordtest Technical Report 555

SP Swedish National Testing and Research Institute

SP Fire Technology
SP REPORT 2004:10

Abstract

The objective of the project has been to find a common Nordic approach on how the new EN test standards on testing of fire resistance of building products should be applied until the CE marking has been fully established.

Due to the wide extent of the work limitations had to be made. Only four of the new test standards have been dealt with within the scope of this project. Focus has been made on assessments, which are of importance for customers, as well as on where differences would occur between the Nordic laboratories.

Key words: fire resistance, interpretation, test standards

SP Sveriges Provnings- och Forskningsinstitut
SP Rapport 2004:10
ISBN 91-7848-983-0
ISSN 0284-5172
Borås 2004

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SP Report 2004:10

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Preface

This work was initiated by NBS (Nordiska Brandlaboratoriernas Samarbetskommitté) and financially supported by Nordtest, grant 1655-03. The work presented here is a compilation of the collaborative work by the fire laboratories at VTT Building and Transport, Norwegian Fire Research Laboratory (NBL), Danish Institute of Fire and Security Technology (DIFT) and Swedish National Testing and Research Institute (SP) who have also coordinated the project.

Summary

The objective of the project was to find a Nordic approach to how the new EN test standards for fire resistance testing of building products should be applied until the CE marking has been fully established.

Due to the wide extent of the work limitations had to be made. Four of the new test standards have been examined, EN 1363, EN 1365-2, EN 1634-1 and ENV 13381-4. Focus has been made on assessments, which are of importance for customers, as well as on where differences would occur between the Nordic laboratories.

An extensive list of questions regarding interpretation of the text in the standards have been compiled. As far as possible a common Nordic interpretation has been made. Where it has not been possible to answer the questions, or a mutual agreement not could be made, the questions were decided to be forwarded to EGOLF (European Group of Official Laboratories for Fire testing).

1 Introduction

1.1 Background

Due to the European harmonization, a package of new testing standards has been developed. These standards differ more or less from the national standards which have been used up to now in the Nordic countries. During a period, the so called transition period, both the currently used national standards and the new European standards will be used in parallel. It is therefore important to establish common Nordic guides on the implementation and use of the new standards.

A project, financed by Nordtest, was launched with the objective to find a Nordic approach to how the new EN test standards should be applied until the CE marking has been fully established. Due to the wide extent of the work the work had to be limited. Only some of the new test standards have been dealt with within the scope of this project. Focus has been made on assessments, which are of importance for customers, as well as on where differences would occur between the Nordic laboratories.

Another objective of the project has been to create a closer contact between the Nordic laboratories. A common Nordic interpretation of the standards would increase the possibility to influence the work on the European level.

1.2 Description of project

The project has been divided into three parts.

The first part has been a compilation of prior experiences, proposals of interpretations, the use of European test standards and proposals of assessment criteria based on successful test results.

The second part was to organize and accomplish a two-day workshop where the results of the first part were presented and discussed. During the workshop the participants discussed and came to an agreement upon the interpretation of the test standard and made notes on the progressive work with assessment standards.

The third part was to compile and publish the outcome of the workshop.

Since there are many test standards, they could not all be dealt with within the scope of this project. Instead focus was made on the most frequent used test standards. The methods covered within the project were the general test standard for fire resistance, EN 1363 [1], the method for load bearing floors and roofs, EN 1365 part 2 [2], the method for fire doors, EN 1634 part 1 [3] and the method for applied protection to steel members, ENV 13381 part 4 [4]. These test standards cover most products regarding fire resistance testing of constructions, except service installations.

Within the scope of the project four Nordic laboratories participated. Each institute was responsible for one test standard. The standards were divided as follows:

- VTT was responsible for EN 1363 General requirements for fire resistance testing
- NBL was responsible for EN 1365-2 Load bearing floors and roofs
- DIFT was responsible for EN 1634-1 Fire doors
- SP was responsible for ENV 13381-4 Applied protection to steel members

Before the workshop was carried out a background material was compiled for each standard. The responsible laboratory gathered information from the other participating institutes regarding problems, interpretations and other relevant information of the standard concerned. The material was compiled and arranged as a base for discussions at the workshop.

At the workshop the background material was discussed. The objective was to discus and come to an agreement upon the interpretation and application of the test standards so that the test results would be accepted in the rest of the Nordic countries. Furthermore, policies and practise regarding assessments were also discussed to reach a mutual Nordic position. Since the work was very comprehensive the most frequent used assessments were chosen for this project.

After the workshop the guidelines, which were decided upon, were compiled. A document was written where the interpretations and practise were specified. The document will form the basis of future fire tests according to European standards. Furthermore an easily comprehensible document will be compiled of the material. If it is of value for the industry it will also be published on the Internet.

The project will also be presented to the rest of Europe through EGOLF (European Group of Official Laboratories for Fire testing).

2 Documentation of prior experiences

An important part of the project was the preparatory work with documentation of prior experiences. The experiences were the base for the continuous work with the project. The documentation contained the following parts:

- Incorrectness in the actual standard
- Loss of anything in the actual standard
- Obscurities in the text of the standard
- Legibility of the figures of the actual standard
- Possible limitations in the testing pedagogy
- Compilation of questions to EGOLF
- Describe the status regarding the assessment standard
- Guidelines for assessments for national type approval certificates during the transitional period until mandatory CE marking
- Proposal of mutual Nordic position regarding assessments

3 Workshop

3.1 General

A workshop was organized on November 13-14, 2003. In addition to the test laboratories the national building authorities were invited. The workshop was divided into three parts. The first part contained a presentation of the compilation of prior experiences that each laboratory had made. The second part was group discussions, which was the main part. Each group worked their way forward to a mutual Nordic position regarding the standard concerned. Finally each group presented the results from the group discussions.

3.2 EN 1363 General requirements for fire resistance testing

Members of the working group for general requirements for fire resistance testing were:

- Fredrik Rosén, SP – secretary
- Lars Boström, SP
- Anders Drustrup, DIFT
- Øystein Sommerset, NBL
- Henry Weckman, VTT

Each of the items below refers to the relevant paragraph in the standard EN 1363-1.

Question	Conclusion
Paragraph 3.1.18 The definition of continuous flaming is vague especially at pulsating flaming.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** If a period between two or more consecutive flames is less than the duration of the previous flame, then these flames are counted as one flaming. If the size of flaming exceeds 1 meter in plane of the tested element or 0,5 meter normal to the plane of the tested element, then the flaming is always considered as sustained flaming.
Paragraph 4.5.1.1, second paragraph The thickness of the plate reads now "(0,7 ± 1) mm".	It should read "(0,7 ± 0**,**1) mm".
Paragraph 4.5.1.1, fourth paragraph The density of the insulation reads now "(280 ± 30) kg/m^2".	It should read "(280 ± 30) kg/m^3".

Paragraphs 5.2.2.1 and 5.2.2.3 The furnace shall be operated so that the pressure at the top of vertical specimen and at 100 mm on the underside of horizontal test specimen shall at no time exceed 20 Pa. Which pressure shall the furnace be controlled with?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** Exclude the expression ”at no time exceed”.
Paragraph 9.1.2 How is the distance to the thermocouple defined? Is it the distance to the centre of the copper disc or the edge?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
Paragraph 9.1.2.2 How shall thermocouples be located for ”corrugated or ribbed constructions”? What thermocouples shall be included in the average unexposed face temperature?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** All thermocouples shall be included i.e. thermocouples located in peaks and valleys. ***Nordic practice:*** All thermocouples shall be included i.e. thermocouples located in peaks and valleys.
Paragraph 10.4.5.2 How shall the cotton pad be employed – at flaming or at the occasion of hot gases?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** The cotton pad shall not be employed at a separate flame but shall be employed at pulsating flaming. The cotton pad shall of course also be applied at the occasion of hot gases. ***Nordic practice:*** The cotton pad shall not be employed at a separate flame but shall be employed at pulsating flaming. The cotton pad shall of course also be applied at the occasion of hot gases.
Paragraph 10.4.5.2 Is it an integrity failure if a flame accidentally ignites the cotton pad during an integrity test?	***Nordic practice:*** An ignition accidentally or not is an integrity failure.
Paragraph 10.4.5.2 Can the operator of the cotton pad angle the cotton pad at deformed constructions to find the worst case?	***Nordic practice:*** It is possible to angle the cotton pad to find the worst case.

Paragraph 10.4.5.2 How shall the cotton pad be removed from the construction after the integrity test - fast or slowly?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** The cotton pad shall be removed slowly. ***Nordic practice:*** The cotton pad shall be removed slowly.
Paragraph 10.4.5.4 and 3.1.18 When does the flaming result in an integrity failure – when the flame arises or when 10 seconds have passed?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** No proposal could be agreed upon. ***Nordic practice:*** The occurrence and duration of any flaming shall be recorded.
Paragraph 10.4.5.4 and 3.1.18 Sometimes flames arise between the door leaf and the frame. Is this an integrity failure?	***Nordic practice:*** Flaming must entirely occur on the unexposed surface if it is to be regarded as an integrity failure.
Paragraph 10.4.5.4 and 3.1.18 Sometimes small and almost invisible flames occur caused by the binder content in the insulation material. How shall these be regarded?	***Nordic practice:*** The occurrence and duration of any flaming shall be recorded.
Paragraph 11.3 What thermocouples shall be considered in ”initial average temperature”?	***Nordic practice:*** Average unexposed face temperature is defined in section 9.1.2.2. Only thermocouples according to section 9.1.2.2 shall be considered in ”initial average temperature”.
Paragraph 12.1 v) and ANNEX A Philosophically the direct field of application has nothing to do with testing. It may be given as guidance in the standard, as it is now. However, the requirement of stating that in the test report should be removed to the relevant part of the classification standard and related sections in other test standards concerned.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** We propose to delete the paragraph 12.1 v) of EN 1363–1.

Paragraph 12.2 The standard uses the wording "In addition" when giving guidance to a short form test report. This has been found unclear or at least unnecessary. A short form of the test report usually is to be written when the test results are not satisfying the customer. In such a case the report can be even shorter than what the standard now proposes.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** We propose that the whole paragraph 12.2. of is deleted. Any kind of a report may be written just by stating that the report deviates from the standard. ***Nordic practice:*** In the document it shall be stated that it is a short form report and there shall also be a reference to the full test report.
Paragraph 7 in EN 1363-2 From what direction shall the impact test be conducted?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.

3.3 EN 1634-1 Fire doors

Members of the working group for fire doors and shutters:

- Per Adolfsson, SP
- Ejnar Danø, DIFT - secretary
- Hans Christian Jacobsen, NBL
- Pär Johansson, SP
- Matti Immonen, VTT

The following documents were at the disposal for the members of the working group during the meeting on 13 and 14 November 2003:

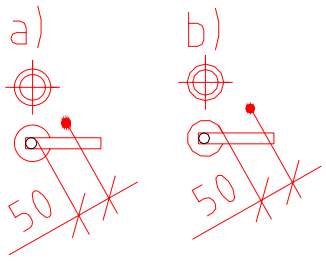
- EGOLF TC2 directory of helpdesks 2000/2001/2002/2003 (the documents EGOLF TC2 N300 Revision 1 and EGOLF TC2 N330).
- EGOLF TC2 helpdesk documents (last version) related to fire doors (the documents EGOLF TC2 N262 Revison 2, EGOLF TC2 N269 Revision 2, EGOLF TC2 N285 Revison 2, EGOLF TC2 N306 Revison 1, EGOLF TC2 N307 Revision 1, EGOLF TC2 N311 and EGOLF TC2 N312).
- EGOLF draft Technical Resolutions No. 04 (EGOLF TC2 N321), No. 06 (EGOLF TC2 N323) and No. 10 (EGOLF TC2 N 327).
- EGOLF TC2 N334 Annex 3 (2003-11-05), last report from the TC2 task group 4.
- CEN/TC 127 N 2080, proposed amendments to EN 1634-1 (presented in connection with the CEN/TC 127 meeting on 13 October 2003).

Each of the items below refers to the relevant paragraph in the standard EN 1634-1:2000.

If nothing else is stated below the word door also include shutter assembly, operable window etc. (compare paragraph 3.1 of the standard).

A door is a non-load bearing element, which include one or more operable leaves on curtains.

Question	Conclusion
Paragraph 3.1 Definition of door or shutter assembly (doorset)	***Proposal:*** It is our opinion, that non-load bearing elements which can be opened manually but in practice are opened only for inspection and cleaning purposes (and equivalent) are considered to be non-operable and therefore shall be tested in accordance with the standard EN 1364 "Fire resistance tests for non-load bearing elements", e.g. EN 1364-1:1999 "Walls". This kind of an element should be equipped with a locking mechanism, which only can be activated with some kind of a tool.
Paragraph 6.5 How shall the verification of the test specimen be made?	***Proposal:*** It is recommended, that the verification is made during the manufacture of the test specimen. However, it is the sponsor of the test who can choose between the two options described in the standard. A separate inspection report should be written if the verification is made during the manufacture. A reference to the inspection report should be included in the test report. Another organization may perform the verification during the manufacture on behalf of the test laboratory. The test laboratory is always responsible for the verification.
Paragraph 7.2.3 The following note is written in the standard: "NOTE. If the door assembly is tested in conjunction with a non-combustible floor then this may not represent the situation when the door is installed above a combustible flooring such as timber or carpet."	***Proposal:*** The door should be tested with the worst possible flooring. Therefore the sponsor should be informed about this before the test and the sponsor should decide on the type of flooring.
Paragraph 8.2 Prior to the fire test all doors shall be subjected to mechanical conditioning, i.e. operability test (25 cycles) in accordance with prEN 14600:2002, 5.1.1.1. This test can be done before the test specimen (installed in the supporting construction) has been mounted on the furnace. Shakedown conditioning (5 000 cycles) in accordance with 5.1.1.2 shall be done on doors incorporating loose or friable material. Friable material is defined in prEN 14600:2002 but loose material is not.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** It is recommended that the final setting in accordance with EN 1634-1, 10.1.4 and prEN 14600, 5.1.1.3 and 5.1.1.4 is done when the test specimen is mounted on the furnace. ***Nordic practice:*** It is recommended (not a requirement) that the final setting in accordance with EN 1634-1, 10.1.4 and prEN 14600, 5.1.1.3 and 5.1.1.4 is done when the test specimen is mounted on the furnace.

Paragraph 9.1.2.1 The text "No thermocouple shall be placed within 50 mm of any ironmongery" is not clear. Guidance can be found in the EGOLF helpdesk 10-2000, which claims, that the distance of 50 mm should be measured from the edge of the ironmongery that emerges from the surface of the door leaf or frame. There is no further guidance on the meaning of "ironmongery that emerges" and it is not prescribed whether the 50 mm distance is from the centre of the thermocouple or from the edge of the copper disc (see the wording "within 50 mm" above). The figure a) shows the center of the thermocouple positioned 50 mm from the door handle and figure b) shows the center of the thermocouple positioned 50 mm from the visible lock plate.  	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Nordic practice:*** Until further guidance is given the test laboratories could be free to interpret this requirement. However to be on the "safe side" the figure a) should be followed.
Paragraph 9.1.2.1 A definition of ironmongery is missing. Is it the same as door hardware or something else?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
Paragraph 9.1.2.3 It is noted that that figure 24 is not in accordance with paragraph 9.1.2.3 b) ii).	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** The thermocouple on the frame should be positioned 100 mm from the door joint on the primary leaf side.
Paragraph 9.1.2.3 It is noted that figure 14 is not in accordance with paragraph 9.1.2.3 c) i). See also EGOLF helpdesk 09-2000.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
Paragraph 9.1.2.4 Who decides whether supplementary procedure should be used or not?	***Proposal:*** It is the sponsor of the test who decides whether the thermocouples in accordance to the supplementary procedure should be included or not. The laboratory should inform the sponsor about the consequences.

Paragraph 10.1 The gaps shall be measured after the mechanical conditioning, see paragraph 10.1.1 in the standard. It is unclear what to do if the gaps (set in accordance with paragraph 7.3 – during the installation of the door) change beyond the tolerances as a consequence of the mechanical conditioning. This may happen, especially for doors which are mechanically conditioned for 5 000 cycles. Should the gaps be adjusted and if so should the mechanical conditioning be repeated? Is it the gaps measured before or after the mechanical conditioning which should be used in the direct field of application, see 13.3.3.2 a)?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Nordic practice:*** Until further guidance is given the gaps should be measured both before and after the mechanical conditioning. No adjustments are done after the mechanical conditioning. Guidance on how to use measured gaps is under discussion, see document CEN/TC 127 N 2080.
Paragraph 10.1.2 Difficulty to fulfil the required accuracy.	It is our opinion that it is difficult to maintain an accuracy not exceeding 0.5 mm when measuring inaccessible gaps.
Paragraph 10.1.4 Is it possible from one test to cover the door both with and without door closer? There is no guidance in the direct field of application.	We have to wait for the relevant EXAP standard. ***Nordic practice:*** In the mean time (for a door with a door closer) the door closer should be included and should not be disconnected before or after the final setting.
Paragraph 10.2.2 Clarification is needed on the measurement of integrity.	***Proposal:*** The cotton pad should be used within the last 2 minutes before the classification time. For example: If the classification time is 60 minutes, then the cotton pad should be used between 58 and 60 minutes.

Paragraph 13.2.2 c) Each of the dimensions of a glass may be decreased in accordance with the direct field of application. If the tested glass pane area was quite large in relation to the door leaf area then it is most likely that the non-glazed area of the door leaf has not been evaluated for insulation requirements (no thermocouples used on that area during the test). If the glass dimensions are decreased then the non-glazed area will be increased and the insulation requirements will have to be considered.	***Nordic practice:*** It is not always correct that the glass dimensions can be decreased. The condition is (at least), that the insulation properties of the non-glazed area of the door leaf have been evaluated during the fire test.
Paragraph A.2.3 Which materials are considered to be hygroscopic?	Mineral wool and silicone-based sealants used to fill gaps between the door frame and the supporting construction are considered not to be hygroscopic materials. Therefore these kinds of materials are not required to be conditioned for 7 or 28 days.

3.4 EN 1365-2 Load bearing floors and roofs

Members of the working group for floors and roofs were:

- Eva Andersson, NBL
- Rolf Hilling, SP
- Mette Kristin Ulfsnes, NBL - secretary

The laboratories had limited experience with the use of this specific standard, but have examined the standard text to find if the standard is easy to use/understand or not.

The items below refer to Sections in EN 1365-2: 2000.

Question	Conclusion
Paragraph 1 It was discussed if the standard was meant to be used for testing glazed roofs or not, (e.g roofs for atria), but there was no conclusion on this matter.	

Paragraph 5.1 b) Figure 2 does not explain the situation with pressure measurement for suspended ceiling in combination with sloped roof construction described in the second item of the text. There should be a separate figure for a suspended ceiling showing the pressure measurement points ps_1 and ps_2 (ceiling). If there should not be 2 measuring points, the text in item 2 should be revised and clarified. Figure 2 is wrong / inadequate because of: • The text mentions ps_1, but the Figure only shows ps. • The roof construction is supported by mineral wool. The pressure below the suspended ceiling will not be 20 Pa if it is supposed to be 20 Pa at position ps close to the sloped roof construction. It is only possibly to control the pressure to 20 Pa at one level, eg. at position ps_1 for the sloped roof construction.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** A revision of Figure 2 or the second item of the text should be performed.
Paragraph 5.2 It is defined in EN 1363-1 item 4.3, that the total contact area for any type of loading equipment should be maximum 10% of the test specimen area. In this item in 1365-2 it is defined that the total contact area for a point load should be maximum 16% of the total surface area. This means that in EN 1363-1 a uniformly distributed loading system is described to be maximum 10%, and a point load is described by the requirements in EN 1365-2 to be maximum 16%.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** Which standard is overruling the other for point loads? The maximum contact area should not only be described for a floor surface, as stated in this text, but should also be valid for a roof construction.
Paragraph 6.1 c) The text is not in accordance with figure 3: If $X < 100$ (the height of the support), the formula for L_{sup} will be wrong. This formula is made for $X > 100$: $L_{sup} = L_{exp}$ + up to half the length of the bearing at each side.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** "Up to half" in the formula could i.e be replaced with "minimum"

Paragraph 6.2.2 The different roof types should be illustrated by figures to avoid inequality in interpretations of the design of the different roof types.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision. ***Proposal:*** There should be figures showing examples of: • Trussed rafter roof construction • Apex roof construction • Monopitch roof construction
Paragraph 6.2.2 There must be a figure showing an example of a roof with a "span normal to the inclination", because this is not unambiguous understood.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
Paragraph 6.3.3 h) There is a conflict between this item and the requirements in Field of direct application item 13c. The item 6.3.3 h defines that "*when pitched roof constructions with suspended ceilings are tested horizontally, the height of the cavity of the test construction shall be equal to half the maximum cavity height of the construction, with a tolerance of ± 20%*". The item 13 c defines that "*the height of the cavity or cavities is equal to or greater than the height tested*." This will be a conflict for a sloped roof construction with a small angle that has a much smaller h_{max}. The horizontal test shall apply for all angles of roof constructions.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
Paragraph 6.3.4 a) A trussed rafter roof shall be tested as a complete construction. This type of construction is normally larger than the test furnaces. The item 6.1.b) has defined the minimum dimension of the test specimen to be 4 x 3 m. How shall the dimensions and the junction points in the trussed rafter roof constructions be reduced correctly when the length is reduced?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
Paragraph 6.3.5 How shall the load distribution be on a roof construction with a glazed pane (i.e. when using a point load system)? Shall the load be distributed on the pane/frame/roof or only on the frame/roof?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.

Paragraph 9.1.1. b) The wording "in addition to 9.1.1 a)" can be understood to that there should be two levels of plate thermometers for registration/controlling the furnace temperature. If it is meant that the plate thermometers in 9.1.1.a) shall be placed in an other position for sloped roof constructions, the content in this item should be reformulated to i.e "The plate thermometers described in 9.1.1.a) shall be located …"	This question should be sent to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
Paragraph 9.1.2.2 A numerical value is missing for e_2 in Figure 5, most probably this should be 50 (50 mm). To simplify the reading and understanding of the text together with Figure 5, e_1 and e_2 should be included in parenthesis into the text c) and d) and e) and with reference to the relevant figure on page 24 (which means that the 4 figures should be individually numbered). In the text below Figure 5 the definition for e_2 should changed to: $e_2 \geq 50$ mm or $w_b/2$ whichever …. In the drawing at the bottom to the right, e_2 should also be pointed out on the bottom layer of floor boards where w_b is shown and the text of 9.1.2.2 should be changed accordingly. The case of three or more layers of board should also be addressed.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
Paragraph 9.2 The figure 5.1.b does not exist. It should most probably be a reference to figure 2 instead.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
Paragraph A.3.3 Where should the thermocouples on the window frame be placed? In EN 1364-1 is it defined with a figure to be on the front of the frame? There should be a figure in this standard as well to clarify the correct position of the thermocouple. It is not mentioned in the standard text if the thermocouples should be placed on the front of the frame or on the side of the frame where you expect the highest temperature.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.

3.5 ENV 13381-4 Applied protection to steel members

Members of the working group for applied protection to steel members:

- Robert Jansson, SP – secretary
- Ulf Danielsen, NBL

Question	Conclusion
According to the main standard, EN 1363-1:1999, the product shall be representative of the use of the element in practice. Does this mean that both spray applied and brush applied intumescent paint must be tested in full scale? Are there any systematic investigations done to examine the influence of the application method?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
The standard says that every attempt shall be made to avoid thermocouple wire from the test specimen to be routed in the hot area of the furnace. NBL has good experience with shielded wires in the hot zone. Is it possible for NBL to use that kind of setup if they could prove that it has no influence on the results? This type of thermocouple is preferred for thin film intumescent applications in order to avoid “crack advisors” beneath the fire protection material.	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.
In the permitted extensions table 6, there are no differences between reactive and passive systems. That leads to the conclusion that the thickness from an intumescent paint test can be extrapolated ±20% and the section factor interval can be extrapolated -20% to +50% from the same test if the differential lambda method is used for calculation. This is very strange because one of the most important parameters when testing intumescing products is the stickability and to allow this type of extrapolations is to extrapolate out in the unknown area. Is this the idea with the standard?	This question should be forwarded to EGOLF Helpdesk or CEN TC 127 for interpretation and revision.

4 Conclusion

The survey of the European four test standards EN 1363, EN 1365-2, EN 1634-1 and ENV 13384-4 showed that a lot of questions regarding interpretation of the standards were similar among the institutes. An extensive list of unclear paragraphs in the standards have been prepared. As far as possible a common Nordic practice has been agreed on.

The questions of interpretation and further clarification will be compiled in a document and sent to EGOLF for further interpretation and revision.

It is not always accepted that a test in accordance with EN 1634-1 can be used as basis for national classification/approval. For example in Denmark doors cannot be classified in the classes F-30 and F-60 based on EN 1634-1 testing. The reason is that there is no canopy required in EN 1634-1. However, elements, which are classified in accordance with EN 13501-2, are accepted in Denmark, Finland and Norway, but not in Sweden, at the present time.

5 References

[1] EN 1363-1 Fire resistance tests – Part 1: General requirements

[2] EN 1365-2 Fire resistance tests for load bearing elements – Part 2: Floors and roofs

[3] EN 1634-1 Fire resistance tests for door and shutter assemblies – Part 1: Fire doors and shutters

[4] ENV 13381-4 Test methods for determining the contribution to the fire resistance of structural members – Part 4: Applied protection to steel members and project leading

Appendix A - Participants at the workshop

The following persons participated in the workshop:

Matti Immonen, VTT
Henry Weckman, VTT
Ulf Danielsen, NBL
Hans Christian Jacobsen, NBL
Øystein Sommerset, NBL
Eva Andersson, NBL
Mette Kristin Ulfsnes, NBL
Anders Drustrup, DIFT
Ejnar Danø, DIFT
Per Adolfsson, SP
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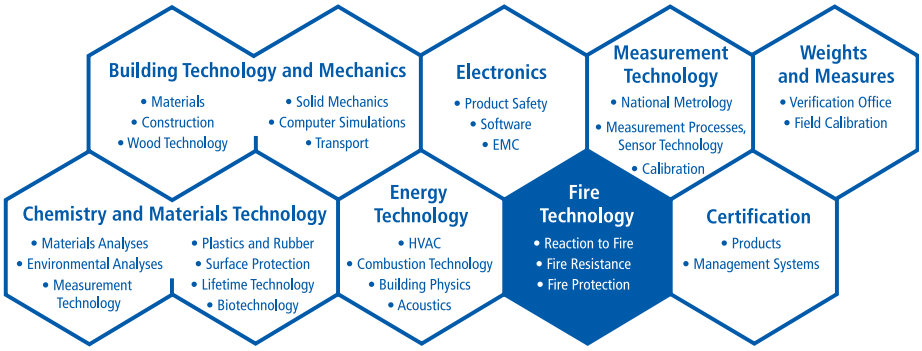

SP Fire Technology
SP REPORT 2004:10
ISBN 91-7848-983-0
ISSN 0284-5172

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