

Answers from the Steering Group of project SI2.825082 on questionnaire (7.10.2020)

“Finalisation of the European approach to assess the fire performance of facades”

Revision 1: January 12, 2021 – addition of response from a Member State

Introduction

The project team has received several hundreds of comments, mostly on the assessment method, but also on how to proceed with the project. The majority of the questions can be, have been or will be solved by the project team, although some questions need to be brought back to the Member States and Stakeholders reflection and discussion. Therefore, a questionnaire was prepared and sent to the Steering Group after the first Steering Group meeting held on September 15, 2020.

When the questionnaire was prepared and delivered to the Steering Group it was not foreseen how the results will be used for further analysis and communication (as this is also dependent on the input received). It has therefore been decided that all answers received will be presented anonymously.

We have received responses from 13 Member States and 10 Stakeholders. The analysis of the responses has been divided between these two groups, i.e. the positions of Member States and the Stakeholders are presented separately.

The current summary and analysis is based on the information received this far. Those Member States and Stakeholders that have not yet provided their views are welcome to do so in their earliest convenience. The additional inputs will be inserted into the summary and analysis, however in order to make progress the project team needs to start planning the next steps on the basis of the information available at the moment.

As you may recall the questionnaire included six questions, and each question included comments on the topic of the question from both the project team and the EC. The full set of questions, comments from the project team and the EC as well as the answers received from the Member States and the Stakeholders are presented in the Annex to this summary document.

Analysis and results

The following tables show the received answers in a condensed form. The answers are divided into two groups, i.e. answers from the Member States and answers from the Stakeholders. After reading through all the received answers, we have defined a few general consolidating answers, and thereafter sorted the answers given by each participant under one of these headings.

1. How should the façade fire performance tests be performed until the European assessment method is published and available?		
	Member States	Stakeholders
Keep national methods	8	4
Use national methods, start using new method when available	1	0
Issue common technical guidelines for testing	2	0
Use BS and DIN for MS without national methods	1	5
Commission delegated regulation (1)	1	1

(1) Please note that the Commission has no mandate to issue such delegated acts

2. Shall the secondary opening be mandatory in the medium fire exposure test? If so, shall it have the same position as in the large fire exposure test, or be moved downwards/sidewise closer to the fire source?		
	Member States	Stakeholders
Mandatory	7	3
Optional	4	5
No preference	2	2

3. Shall curtain walls be removed from this assessment method?		
	Member States	Stakeholders
Include	10	2
Exclude (2)	3	2
No position	0	6

(2) One MS proposes exclusion at least for "medium size" test

4. Shall assessment of floor to external wall junction be included?		
	Member States	Stakeholders
Include	0	2
Exclude	13	7
No position	0	1

5. How can the Steering Group be more involved in the steering of the project?		
	Member States	Stakeholders
Keep it as it is	4	2
Inform SG when new material is available	2	0
More frequent SG meetings	3	4
No opinion	4	2
General comments on management	0	2

6. What failure criteria shall be used for falling parts?		
	Member States	Stakeholders
Weight	3	1
Weight and flaming	4	2
Weight and distance	1	0
Size	1	0
Large pieces	1	0
Size and flaming	1	0
Project team decides	1	0
More discussions needed	0	6
No opinion/comment	1	1

The initial way forward

Based on the received answers the following way forward will initially be chosen:

How should the façade fire performance tests be performed until the European assessment method is published and available?

In general terms a status quo is suggested, i.e. to continue as it is.

For Member States that do not use a large or medium scale façade test method at the moment, and which are in the progress of introducing one, it is recommended to use the DIN 4102-20 for a medium heat exposure, and the BS 8414 for a large heat exposure test.

Shall the secondary opening be mandatory in the medium fire exposure test? If so, shall it have the same position as in the large fire exposure test, or be moved downwards/sidewise closer to the fire source?

The assessment method will keep the secondary opening for both the medium and large heat exposure tests. It can be reviewed later whether it shall be optional or not, as this does not affect the continuation of the work on the assessment method.

Shall curtain walls be removed from this assessment method?

The assessment method will keep curtain walls in the scope since certain criteria is currently not assessed through other standards used for curtain walls, and some Member States have regulations on these criteria.

Shall assessment of floor to external wall junction be included?

No further work will be done on assessing the floor to external wall junction.

How can the Steering Group be more involved in the steering of the project?

Formal Steering Group meetings will be held in accordance with the ToR and the Inception report. In between the formal meetings the Steering Group will be invited into informal project update meetings as needed.

What failure criteria shall be used for falling parts?

The project will continue with the original plan, i.e. different techniques for measurement of falling parts (size and weight) as well as continuous flaming of falling burning parts will be investigated. Decisions on the final proposal will be made when more results are available.

Annex – Questionnaire and answers from Member States and Stakeholders

1. How should the façade fire performance tests be performed until the European assessment method is published and available?

Background: It will take several years (time taken by the current project, standardisation process following the project, start of use of new standard in product testing) before the system for CE-marking of the fire performance of facades is in place. During this time façade fire testing and assessments are needed. A common approach or recommendation on how to test during this period would be useful, especially for those MS who do not yet have a method in their present regulations.

Comment from Commission:

This input is needed in order to be able to propose a uniform/harmonised change management approach.

Reply to question 1:

Reply from Member States

<p>NN regulates actually façade fire performance due to the lack of European standardisation by national standard NN and will keep that procedure until a European standard is published and available.</p>
<p>Commission delegated regulation could be a solution to ensure a uniform and harmonised implementation of the new method until the EN standard will be published.</p>
<p>At this moment we still have to use actual national rules (for NN it is NN) and reaction to fire (EN 13501-1). We would like to start with testing according to draft of the assessment method, which should be published during October.</p>
<p>NN does not see the need for such a common approach. As long as no harmonized method is available, we will continue to use our existing regulation and test method.</p> <p>Countries without a national test about to change their regulation would probably benefit from using a test that is similar to the new one (BS or DIN). This is however in our opinion up to each member state to decide.</p> <p>When the new test method is ready, we will probably accept it as an alternative in our regulation even if CE-marking is not in place due to co-existence periods etc.</p>
<p>From our point of view, there is only the possibility of using existing national test methods that have already been introduced. Countries that do not currently have a test method should choose one from another country.</p> <p>From our point of view, in the transition phase from the national to the European test method, we must introduce certain transitional regulations on how national test results may be used.</p> <p>We consider the advance use of the draft for the European test procedure to be critical, as there exist no empirical values and the method will still change over the coming period. It will therefore be rather difficult to find appropriate transitional regulations for this case.</p>
<p>Regarding the lack of facilities for testing in some Member State, we consider that a small-scale test shall be used until a European assessment is available.</p>

For many years' regulations of NN (being responsible for building regulation issues in NN) exist with regard to fire safety requirements for external wall claddings and external walls including the necessary test evidences for determination of fulfilling these requirements.

Therefore, until the coming harmonized European fire test and assessment method for facades will be available, it is Member State's responsibility to decide how to proceed in cases where large-scale testing of facades is needed with regard to safety requirements in their regulations.

NN will use in its general fire safety regulations, prescriptive rules defining an acceptable solution based on small scale tests and will allow the use of existing large scale façade test as alternative to these prescriptive rules (BS 8414-1, BS 8414-2, DIN 4102-20, LEPiR 2).

The application of the DIN 4102-20 poses some problems because the acceptance criteria are not established in a standard or other publicly available document.

We do not have method for assessment fire performance of facades in NN legislation. Some guidelines can be issued regarding how to assess fire performance of facades. Other option – can be issued ETAG for facades, the process of issuing ETAG is faster than preparing new standards. This ETAG shall include also how to perform fire behaviour assessment of facades for existing facades types and material combinations.

In NN, we do not have our own standard for testing the fire properties of facades. Because the method of testing and classification of combustible building products is based on different fire scenarios, it is not suitable for evaluating facades. We propose preparation a technical guideline as soon as possible, which designers will be able to use to assess the facades. The possibility of proving the suitability by testing in the NN fire laboratory according to the emerging EN method should also be considered.

We shall continue with Euroclases system, as we don't have an alternative method.

Until the European assessment method is published and available, fire performance test should include DIN 4102-20 or BS 8414, which were the basis for development of new assessment method.

In current NN regulation, the requirements for fire behaviour of facades are set in accordance with reaction to fire classification for building products installed into the façade. Requirements are set for ETICS system and ventilated rainscreen cladding system.

Currently, in NN, compliance with regulatory requirements for fire safety in this regard can be demonstrated by use of materials whose external surfaces, as well as cladding surfaces which face a cavity, meet specified classification standards, in accordance with EN 13501-1 or BS 476-6.

For certain building uses, there are limited requirements for buildings with a height of less than 18m.

For buildings more than 18m high, insulation material in a drained and/or ventilated cavity in the external wall construction should be of materials of limited combustibility (Class A1, Class A2-s3d2 or better, meets performance criteria when tested to BS 476-11, or material with non-combustible core at least 8mm thick having combustible facings not more than 0.5mm thick) – unless the external wall is of masonry cavity construction, and meets specified conditions.

Alternatively, compliance may be demonstrated by reference to façade fire performance test in accordance with BS 8414, and performance criteria given in BRE Report BR 135.

It is our opinion that large scale tests should be carried out indoors,(for consistent repeatability) with a design fire size of no less than 5MW, to demonstrate the performance of the façade, where materials of limited combustibility are not used in the façade build-up.

We propose continuing to use the BS 8414 tests (Part 1 and Part 2).

Reply from Stakeholders

NN considers that since the European project is concentrating on 2 tests BS 8414 and DIN 4102-20, it does not seem logical to refer to other alternative test methods to those in the package unless sufficiently justified.

Member States wishing to use a large-scale façade test method would be better served in using those methods currently under consideration for the harmonised test method, as well as other methods referenced in harmonised technical specifications e.g. the EAD 090062-00-0404 on Kits for external wall claddings mechanically fixed, provided that test capacity in European laboratories is sufficient to avoid bottlenecks. For those MS who do not yet a method in their present regulations, it should be suggested the uptake of one of these existing assessment methods currently applicable at national level.

This would allow on one side Member States to define requirements for large-scale testing while waiting for the EU method to be developed and implemented. On the other side, manufacturers could refer to consolidated test methods, free to choose those markets that are the most convenient in terms of cost and realization time.

However, more important than the test itself is the extended field of application which at the moment is very limited in almost all the referenced tests. As an example, BS 9414 was developed to allow the extended application of fire performance results for external cladding systems which were previously tested in accordance with BS 8414. Thus, it is necessary that this project at least sets the ground for such extension of the field of application.

As per the CE marking of the façade system tested, we highlight once more that the method currently under development will apply to:

- All elements included in the system such as fixing types, specifications, installation density (i.e. number per m² and layout patterns of fixings, coverage and type of application of adhesive etc.);
- The position of all components in the system;
- Design of construction details such as lintel, joints, ventilation cavities, edges, openings, expansion joint details, fire stopping, cavity and fire barriers.

All these elements go undoubtedly beyond the scope of the legislation of reference for the CE marking of construction products, i.e. the Construction Products Regulation, which solely lays down harmonised rules for the marketing of construction products in the EU.

The best option would be to recommend to all MS which currently do not perform large scale façade testing and assessment and which want to introduce this before the final standards are

available, to use either the BS 8414 and/or DIN 4102-20 method. These are the methods which are already used widely – therefore existing test results can be used and no extra tests with additional test methods in these MS are necessary. In addition, the use of these methods should be the best way to make sure, that products are developed, which in future may comply with the new European requirements, because it has clearly been stated, that the results of the new method shall be comparable to the results from the before-mentioned existing tests.

It is also an important point for product manufacturers to know that they can invest in confidence in developing and testing their products and systems according to BS 8414 and DIN 4102-20, since the future EU harmonised method will deliver comparable results.

Member States already referring to their own method or another method than BS 8414 or DIN 4102-20 (eg. Lepir II in France) should have the freedom to decide on the way to ensure a seamless transition. They should ideally discuss it with the local industry, particularly with suppliers of products and systems who have systems classified and run or are running testing programmes.

Since the inception of this project in 2017, NN has consistently advocated (also in the context of the FIEP meetings) that the quickest way to get a European Assessment method would be to rely on BS 8414 and DIN 4102-20 tests. While the subsidiarity principle of the treaty on the functioning of the EU allows national authorities to regulate in this field in the absence of a European framework, it would be commendable that any national effort takes inspiration from the DIN and/or the BS method(s). This would also make the later transition to the new European assessment method faster and easier, as long as the European assessment method is designed in a way that does not invalidate existing national tests and classifications.

Concerning the methodology for façade fire performance tests to be performed, we would like to stress that the worst outcome for SMEs would be a change to a temporary system for a short time before change again to the method of test (and CE marking) that will result from this project. It would result in an interim period where companies were scared to test because they do not know if their results would have long-term use. I believe the current status-quo (based on national standards) should endure until this project has reached completion and we have a single European test method. SMEs can then choose to test to it and obtain EADs while they wait for a hEN to be cited in the OJEU.

From now until the finalisation of the round-robin project, we believe the European Commission should inform Member States about the test method being developed and provide guidance for Member States:

- For countries which have an existing test method, they should prepare the legislative landscape for the new European test method;
- For countries which are currently developing a test method, they should pause on the development of new national test methods;
- For countries which currently do not have a test method, and want to have one, the Commission should provide guidance on which approach to choose until the project is finalised.

Once the round-robin project is finalised, NN recommends that the Commission encourages Member States to use the test method and its accepted fire scenarios by publishing it as a Commission Decision within the framework of the CPR, prior to the adoption of the new standard in product testing.

Once a Commission Decision is adopted, the Commission should ensure that national test methods are no longer used to prevent an uneven playing field.

The current practice in Member States shall be maintained, a “stand still-like” to be proposed preceding the formal mandate, until a new European method for fire tests on facades is published in a CEN standard. If a change is made to national regulation requirements are advised to refer to the DIN 4102-20 or the UK BS 8414 and not to refer to newly introduced (national) test methods.

NN recommends that the Commission will introduce the technical aspects of the methodology developed by the Consortium through a Commission Decision published in the Official Journal of the European Union. The decision shall only introduce the technical aspects of the test methodology so Member States, laboratories and industry have sufficient information to prepare for the introduction of the new assessment method.

We consider that a full transition from national test methods to the new harmonized assessment method for facades shall only occur after the standardization work on test method and classification is completed and a reasonable transition period is given for MS.

The official introduction of the test methodology through a Commission Decision published in the Official Journal will however offer the possibility for MS, laboratories and industry to conduct fire tests using the new test method in parallel with the standardization work.

In countries which already have existing assessment methods the current practice in Member States shall be maintained until a new European method for fire tests on facades is published in a CEN standard. We are asking for a stand still already ahead of a mandate to CEN to develop a horizontal test standard.

In the case of Member States (MSs) already using a large-scale façade test such as BS8414 or DIN 4102 Part 20 in their national regulations, they should continue to use these until the new harmonised test is introduced. Bearing in mind that it has been clearly stated that the results of any new method should be comparable to the results from these existing tests, this approach should make the transition to new European requirements as seamless as possible. For the same reason, Member States not already testing large-scale façades should carefully consider adopting one of these existing test methods in the interim period to ease subsequent transition.

NN recommends that the Commission communicate to Member States, laboratories and industry all sufficient information to prepare the introduction of the new European assessment method.

For countries that already have a national test in their regulations, it must be possible to maintain it until the end of standardization work on the harmonized evaluation method (test method, classification, and internal comparative tests of member states).

A reasonable transition period should then be ensured in order to allow comparison between existing national methods and the harmonized assessment method. Indeed, it will be imperative to ensure that the current national security level is satisfied / is not degraded by the new European provisions as close as possible to the most secure sovereign provisions.

As a result, the round robin tests which will have to be carried out at the level of the member states can only be carried out under conditions of construction systems similar to those already tested and validated at national regulatory level.

For example in France, the LEPIR 2 test takes into account all the construction details that may have an impact on the propagation of fire on the facade: reinforcements on the windows, barrier

strips for the ETICS, intersections of construction voids for the cladding, smoke tightness and flames at the floor / facade junction, ..

Dialogue with industry stakeholders to enable a smooth transition and minimal market disruption should be encouraged.

2. Shall the secondary opening be mandatory in the medium fire exposure test? If so, shall it have the same position as in the large fire exposure test, or be moved downwards/sidewise closer to the fire source?

Background: At present, the methods using a medium fire exposure, such as DIN 4102-20, do not have any secondary opening. There is thus no historical knowledge on the use of a secondary opening in those methods. Due to the relatively small heat source, the heat exposure at the secondary opening in the medium fire exposure test will be limited and it is questioned whether the secondary opening will give any relevant information on the fire behaviour of a façade system and eventually weaknesses that may be introduced at an opening. The location of the secondary opening needs therefore to be discussed as well as the fact that the secondary opening is relatively far from the plume at the moment in the medium heat exposure test.

Comment from the Commission:

The first phase of the development project resulted in the so called “alternative method” (in addition to analysing the “proposed method” identified in the Terms of Reference (ToR) of the first project). The “alternative method”, now under finalisation in this project, contains secondary opening for both test setups (large and medium exposure), only the placing of such opening was left for further analysis. After the (first) project Member States were consulted on their preferences between the “alternative method” and the “proposed method”, and majority of the Member States preferred the “alternative method” (18 for “alternative method” and 4 for “proposed method”).

- Given the above, there seems to be no reason to change the plan indicated in the ToR of the current project and agreed upon in the contract.
- If Member States have changed their position about the preferences in this particular aspect (secondary opening) the issue have to be reviewed and reassessed.

Reply to question 2:

Reply from Member States

The secondary opening in the medium fire exposure test shall not be mandatory as we agree that the heat exposure at the secondary opening in the medium fire exposure test will be limited and it is questioned whether the secondary opening will give any relevant information on the fire behaviour of a façade system and eventually weaknesses that may be introduced at an opening.

Yes, secondary opening mandatory in the medium fire exposure test and at the same position as in the large fire exposure test. Having different layouts in the two tests will make comparisons of results between the two tests more difficult. And the possibility to estimate performance in the large fire exposure test based on result(s) in the medium fire exposure test will be lost most possibly.

We assume that exact position and size of the second opening would result from theoretical studies and from the first planned tests within the currently solved project. We incline to keep the secondary opening in both test configurations (medium and large exposure test).

NN will probably not use the medium test method and has therefore no strong position on this question. In principle we support what would be most scientifically sound, but in the end, it is up to the member states using the medium test to decide their needs.

In the survey on the preference of the test methods, one could only prefer or reject the different methods as a whole. The alternative method had certain advantages and you had to "buy" these together with the secondary opening. We are convinced that a vote explicitly for or against the secondary opening will show a different result.

From the technical point of view, the secondary opening makes no sense to us. A room fire will always spread in a relatively short time via the windows to the next upper storey, unless fire-resistant windows are required. So we are primarily interested in how the façade-system itself reacts to the fire. The window connection details are tested within the opening to the fire chamber. During the test, these details must be designed as they are to be used in practice. From our point of view, a secondary opening falsifies the test result of the façade-system.

For these reasons we reject the second opening and if it is introduced, it shall be voluntary.

The second opening in the façade should be provided for both medium-scale and full-scale exposure. Its positioning must be as close as possible to the conditions of end-use, in which sense we propose that the location be similar for all types of tests.

Since NN voted for the "proposed method" in the past enquiry after the first project, from NN point of view consideration of the secondary opening is redundant in the medium exposure test level. In addition, it is supposed that the majority of Member States voted for the "alternative method" was mainly focused on the large exposure test level. Furthermore, NN shares the technical concerns (stated above) against the consideration of a secondary opening in the medium exposure test level.

No particular opinion on this aspect.

We prefer the "alternative method", as it has secondary openings and – as it is under finalisation.

No, it is enough for large setup.

We haven't changed our position.

It is proposed to leave secondary opening in the medium fire exposure test. The opening should be moved downwards/sidewise closer to the fire source.

NN view is that our preference is for a large scale test.

Acknowledging the considerations set out at Background, above, if a secondary opening is to be included, there may be value in locating the secondary opening closer to the plume. The position and size of any opening should be proportionate to the opening in the full scale test.

Reply from Stakeholders

No preference to be expressed here.

On one hand, the current BS and DIN standards do not envisage the presence of a secondary opening. These test methods are representatives for the purposes of the fire assessment of facades. It has to be considered that the heat exposure of the DIN 4102-20 standard represents already the effect of a secondary opening.

On the other hand, the presence of a secondary opening would allow a more realistic representation of a building façade. In MSZ 14800-6 for the investigation of the propagation of fire

on building façades in use in Hungary, a secondary opening is applied. The same applies for the French Lepir II test. However, some medium-scale tests do not envisage a secondary opening as this would lower the heat impact in the very same secondary opening area. Ultimately, all depends from the applied fire load and the imposed pass/fail criteria.

We fully support, that it is not necessary to introduce this secondary opening in the medium exposure test, as there are currently no regulatory requirements in place. In addition, it should be considered also to make this only an optional classification for the large exposure test. The preliminary discussions and the theoretical RR have shown that no clear scope for this is in place and the essential questions (using a window frame – which window frame is to be used – how the edges of the façade insulation system shall be constructed around the opening etc.) are not clear and there is no scientific basis available to take a decision. So for countries which do not have a requirement here it would be much easier if test and classification without this opening would be possible also in the future. This could be a step to make sure that the new test can be implemented without concerns about comparability with historical data.

Summary: We recommend to remove this in the medium exposure method and to make it optional in the large exposure scenario.

When member states were asked to decide on the “alternative” or “proposed” method, details about this “alternative” method were missing. The main question at that time was whether the two methods with the different exposure levels should be combined or whether two separate methods on two separate test rigs should be used in the future method. We therefore strongly believe that a reconsideration of details (like secondary opening) is fully justified. In addition, it is worth mentioning that countries using the medium exposure fire test do not have and are currently not considering a secondary opening in their national legislation. Also for the large scale fire exposure, there are some question marks and countries testing according to BS 8414 did not use an additional opening. Finally, in order to allow for comparability of existing test results and the future ones against the new test method, we strongly recommend to introduce the secondary opening only on a voluntary basis and only for the large scale exposure.

We do not have comments on that, as they are new technical subjects, we prefer to let experts involved answered.

NN supports the technical recommendation from the Consortium and Member States which in large majority preferred the “Alternative Method” that includes a secondary opening in the façade. NN recommends including the secondary opening as mandatory for the following reasons:

- It is important that the large-scale façade test is able to provide as much as possible information about the fire behaviour of the façade during real fire events. As such, the test method should be a rough reflection of reality and include, as much as reasonably possible, the elements that could influence the fire behaviour of the façade. Window openings are an essential element for this test because the vast majority of building facades include window openings which can influence the fire behaviour of the façade.
- If the secondary opening were to not be mandatory in the test (allowed as optional test version), there is an inherent risk that the same façade system (façade kit) could have two different fire behaviours and classifications depending whether it was tested with or without a secondary opening. Such case is not desirable as it will create difficulties for national authorities to assess the real fire behaviour of the façade and evaluate compliance with the fire objectives and/or requirements of the building code. In addition, it is expected that architects, designers, specifiers and contractors will not know in

sufficient detail how fire tests were conducted and two different classification for the same façade system (façade kit) could create confusion in the European market which could lead to unsafe façade solution being applied in practice.

Regarding the location of the secondary opening, NN recommends that the secondary opening be lowered to 1.2 m above combustion chamber because a large part of the building stock in EU countries, traditional buildings in use, have a typical spandrel height of 1.2-1.3 m. The test method shall be applicable also for existing buildings with spandrel heights of 1.2-1.3 m. This is particularly important given EU focus on renovation of existing buildings.

For both the medium scale and large scale test the following applies:

Most Member States have a clear position regarding the testing of façade properties around openings. Façade properties around openings are tested by the detailing above the combustion chamber. A second opening is therefore not required. Only four Member States in Europe deviate from that position.

Because current project planning doesn't include tests without a second opening calibration of the proposed tests towards existing to DIN 4102-20 and or the UK BS 8414 will be problematic.

For this reason, the test should allow for the test to be carried out on a test specimen without a second opening and at least part of the test to be performed in the project should be performed without a second opening, for both the medium and large scale test.

A test specimen with a second opening can optionally be tested in a separate test. As the underlying fire scenarios are different a combination of both scenarios in one single test could be problematic.

We support the technical recommendation provided by the Consortium and MS which in large majority selected the "Alternative Method" that includes a secondary opening in the façade. NN considers that the secondary opening shall be kept mandatory, as defined in the ToR, for the following reasons:

- i) Large scale façade fire tests shall be able to provide information regarding the fire behaviour of the façade during real fire events. This is essential in order to ensure safe buildings and compliance with the fire safety objectives of the building codes. Therefore, the test method shall be representative of reality and as much as possible include all the elements that impact the fire behaviour of the façade. Window openings are part of almost all façades and it is known that the façade components around window openings can influence the fire behaviour of the façade.
- ii) If secondary opening will not be mandatory (allowed as optional test version), we can foresee an inherent risk that the same façade system (façade kit) can have two different classifications depending on the configuration used when conducting the fire tests (with or without secondary opening). This option is not recommended because it will be extremely difficult for national authorities to assess the real fire behaviour of the façade and evaluate compliance with the fire objectives/requirements of the building code. Moreover, it is expected that other important actors in the building sector (architects, designers, contractors, etc.) will not have sufficient knowledge about fire tests to evaluate the performance of a façade system (façade kit) that has two different classification. This can create unnecessary confusion in the European market which could lead to unsafe façade solution being applied in practice.

For the location of the secondary opening, we would like to recommend to reduce the distance between the combustion chamber and the secondary opening to 1.2 m. A significant number of

traditional buildings in European countries, existing buildings that are in use today, have a typical spandrel height of 1.2-1.3 m.

Medium scale and large scale test:

No. In most Member States there has been a clear position since decades regarding the testing of façade properties around openings. The façade properties around openings are tested in fire tests by detailing them at the combustion chamber. A second opening is therefore not required. Only four Member States in Europe deviate from that position. For this reason, the test should in general be carried out on a test specimen without a second opening.

A test specimen with a second opening can optionally be tested in a separate test. We doubt that a combination of both scenarios in one single test is feasible, as the underlying fire scenarios are different.

NN was in favor of the proposed method that did not include secondary openings. Current project planning without the option to include a secondary opening or not will make calibration with a secondary opening rather complicated as there is no reference.

From our understanding, when the decision to include the “alternative method” was taken, a number of details were missing in the proposal including ideas about the treatment of secondary openings. Bearing in mind that both the DIN 4102 and BS8414 methods do not have secondary openings, it seems to defeat the object of being able to cross-read for comparative reasons from the existing results to include such openings, particularly when the impact of their presence is so poorly understood and may be profoundly affected by specific location and design details. Accordingly, NN believes that the inclusion of a secondary opening should only be optional and limited to the large exposure test setup.

NN supports the recommendations of the consortium and the Member States by the Alternative method which will include a secondary opening.

The European test should make it possible to evaluate the complete facade construction system, namely the fire behavior of the product + wall in common parts but also the effectiveness of the treatments in the constructive details.

Crucial efficiency for the overall performance of the structure in the event of fire (reinforcements for windows, continuous cutting strips for ETICS, intersections of constructive voids for cladding, smoke and flame tightness at the floor / facade junction, etc.)

Therefore, the test method should be as representative as possible of the reality of a fire by including all the elements that may impact the façade fire behavior.

It is therefore necessary to maintain the predispositions envisaged in the European project, namely at least a second opening (size and positioning to be seen) and a floor / facade junction.

The risk of propagation is aggravated by the crossing from floor to floor via the openings (which can cause flash-over in particular), hence the need to check the performance of the systems as a whole as defined above, taking into account a measured propagation to allow the evacuation of people and the intervention of the emergency services in optimal conditions

If the secondary opening is not compulsory (it will seem considered as an optional version), there is an inherent risk that the same facade system (facade kit) may have two different classifications and destinations depending on the configuration used during the fire tests (with or without

secondary opening). In addition, in the case of tests without secondary opening, the test carried out will only characterize the reaction to fire of the product. Partial test which will not validate its actual behavior in the structure with the appropriate protections and will then need to be supplemented by another fire resistance test (which one?).

This option without secondary opening is not recommended as it will then be extremely difficult for national authorities to assess the real fire behavior of the facade and therefore to validate compliance with fire regulatory objectives / requirements.

Important comments: the choice of the perimeter of the European project and the classification of the products that will result from the European project means the fire evaluation of a facade product (on an opaque facade) and the evaluation of a structure facade (on a facade with opening and singular points).

This choice is in fact directly linked to the issue of CE marking and raises the question: Should the CE marking on fire performance imperatively apply to the product alone or can it be applied to the structure? This question is fundamental for the project and requires a clear and quick position of the Steering Group.

3. Shall curtain walls be removed from this assessment method?

Background: Previous project aimed at defining an assessment method that will be used on all different types of façade systems. This was also one of the results of the project's first phase.

There were comments and positions during the progress of the first phase of the project, arguing that curtain walls should be outside the scope of the method. The main justification for this position was that curtain walls already are tested through the fire resistance standards EN 1364 part 3 and 4.

Resistance to fire tests (and therefore related standards) do not cover certain important aspects of the façade's behaviour and performance under fire. These aspects are addressed in the present method under finalisation, and will be included in the classification method, i.e. fire spread on and in the façade, and falling parts.

Comment from the Commission:

It is acknowledged that for curtain walling there are standards for resistance to fire tests. However, the current project aims at a methodology that will test the façade as a system, and therefore goes beyond the scope of the resistance to fire tests. The methodology under finalisation will contain also a classification system, which will require information that cannot be obtained from the resistance to fire tests. Therefore curtain walling systems should be considered to be within the scope of the method.

Reply to question 3:

Reply from Member States

The assessment method shall be used for curtain walls too, as aspects are addressed in the present method i.e. fire spread on and in the façade, and falling parts which are not covered by the actual fire test regime for curtain walls.
No, because this method is providing many reaction to fire type of performance results which are not measured in a fire resistance test.
From our point of view, it is appropriate to test fire resistance of the curtain walls further according to EN 1364-3 and EN 1364-4, but this new test method is topic rather different than a fire resistance. It is the spread of fire on the facades; therefore, curtain should be also included in this new test method. This procedure will make it possible to set clear requirements in each member state for all types of facades.
We support that curtain walls are a part of the project and possible to test in the future test method.
The test method should also be used to verify the fire spread of curtain walls.
Regarding different construction materials used for facades and fire reaction of these, we consider that curtain walls, shouldn't be part of this European assessment.
In NN curtain walls are not tested and assessed with the current NN test method. It is a complementary approach for the assessment of the fire behaviour of external wall claddings only (cf. title of the standard NN), but it is inappropriate for the assessment of curtain walls. The constructive design of the junction between the curtain walls and the loadbearing structure behind cannot be simulated in a realistic way within this test. Therefore, curtain walls should be

removed from the scope of the coming European test method – at least for the medium exposure level.

In NN, the large scale façade test will probably be used as an alternative to the prescriptive rules defining an acceptable solution based on small scale tests. Curtain wall systems probably will follow the prescriptive rules.

Curtain walling systems can stay in the scope, but probably there will be no need to test them in the large scale test to fulfil the requirements in the NN fire safety regulations.

The reply shall be – it depends on curtain wall end use application – if it is curtain wall inside the Structure (then fire resistance shall be determined) or it is a part of façade (then it falls under requirements for facades).

Yes. From tests according to EN 1364-3 and 4 one can obtain sufficient data to evaluate curtain walling.

We agree with the comment from the Commission.

It is proposed that curtain walls should be considered within the scope of the new method being developed for the entire façade system. Existing test methods (EN 1364 part 3 and 4) cannot determine all the properties of the whole façade system that new testing method will consider.

Curtain walling should be included, as the fire resistance tests do not include classification such as fire spread on the façade and falling parts, debris or droplets.

Reply from Stakeholders

Curtain walling kits must remain out of the scope because there are provisions developed at European level and currently in force since more than 10 years (through EN 13830, EN 1364-3 and EN 1364-4). In case there is a curtain walling not tested according to the relevant technical specifications, it should be recommended to manufacturers to test/assess the performance of those products according to those EN 1363-3 and/or -4 and not according to a technical specification that has not been developed for those products.

As per the “certain important aspects” not covered by the resistance to fire tests, it would be necessary to further detail their nature. For example, in EN 1363-3 and -4 is made reference to specify that falling parts from the curtain walling construction may be recorded if required according to national regulations. It goes without saying that the behaviour of curtain walling kits in fire conditions totally differs from the one of cladded façade systems. **Any amendment to the test method of reference for the fire resistance of curtain walling shall be done in the framework of a revision of EN 1364-3 and -4.**

It is also impossible to see how to extend the EU method currently under development to curtain walling without proper investigations using this type of system, which is completely different to other types of facades based on cladded systems. In the proposals for façade systems to be tested during the round robin phase <https://www.ri.se/sites/default/files/2020-06/Facade%20systems%20to%20be%20tested.pdf> there is not even reference to curtain walling.. And this is correct, because curtain walling should stay out of the scope of this project.

We are missing a clear definition of curtain walls to be able to form an opinion.

No comment.

We do not have comments on that, as they are new technical subjects, we prefer to let experts involved answered.

NN believes that ultimately, the fire performance of all facades systems should be assessed and classified on a similar basis.

For the moment, we believe curtain walling could be excluded, given that the current EN 1364-3 and EN1364-4 standard for curtain wall is an already established system which allows classification, with a harmonized standard EN 13830, and there are already several ETAs using this test on the European Market

However, we should ensure that if curtain walling is excluded, the two methods should eventually converge. A first step would be to ensure that the ongoing revision of EN 1364-3/4 includes part of the method being developed.

No opinion

NN agrees with the Consortium and Commission that the test methodology shall be applicable to different type of façade systems including curtain walls.

We abstain. NN does not represent curtain walls.

There seems to be no clear definition of 'curtain walling' against which to form a judgement on this issue. Further information would be helpful to inform the development of a specific view.

NN argues that the choice of evaluation by the facade construction process as a whole may well adapt to the curtain facade. The regulations are well defined in NN. The answer belongs to this sector

4. Shall assessment of floor to external wall junction be included?

Background: The junction between floor and the external wall is not covered by other standards. It is mainly a fire resistance topic but there are no methods to assess junctions. This feature is currently only assessed in France with the Lepir II method and in Hungary according to MSZ 14800-6 when relevant.

Comment from the Commission:

There seems to be a risk for making the testing method more complicated. We also see potential difficulties in relation to field of application considerations (both direct and extended).

Reply to question 4:

Reply from Member States

The junction between floor and external wall is only part of the façade system if the façade system is a curtain wall (as the curtain wall system is than the external wall). But for curtain walls the junction is already tested by the fire resistance standards EN 1364 part 3 and 4. Therefore we do not see the necessity to assess the floor to external wall junction in the façade test.

No. The method would get far too complicated (it is complicated enough already).

We prefer not to make this facade-to-floor junction part of this test method. It could be complicated to prepare the test rig for this configuration. We don't see a big advantage for a client who goes this optional procedure and wants to try this junction. In the test according to EN 1364-3, there is perimeter seal one of the performance criterions.

In theory it is favourable if junctions can be included. However, in our current test this is not possible to assess and it also seems to be complicated to measure in the new standard. There is a risk that the classification system becomes unnecessarily complicated if additional parameters are included.

We trust the contractors together with the Commission to decide if junctions are possible to include in a smart way.

The assessment of floor to external wall junction shall not be included in this test method. As stated above it is a fire resistance topic and it should be tested according to a fire resistant joint.

Relevant for fire behaviour is how full assembly reacts in case of fire. The junction between the floor and the external wall is part of this assembly and therefore should not be particularly introduced.

The initial origin of developments of large-scale tests for facades in various Member States (e. g. in NN more than 25 years ago) was the experience that certain aspects of façade fire performance (e. g. fire spread) cannot be assessed appropriately with small-scale tests for reaction to fire. Nevertheless, this fact shows that the main aspects of façade fire tests more relate to reaction to fire than to resistance to fire. In opposition to that, the junction between floor and the external wall is widely a fire-resistant-related issue. Hence, from NN point of view the assessment of the junction between floor and external wall is to be ruled out from the coming European fire test method for facades.

No.

It shall be assessed keeping in mind final use of the whole construction – it can be updated if tests results show that junctions impacts test results, for now it shall be reasonable to prepare the test method and then during method validation it can be included.

Probably the junction between floor and external wall is interesting only for curtain walling (and double) facade. This junction is tested according to EN 1364-3 and 4.

Wooden constructions of external walls can be problematic.

We hold the opinion that this decision should fall to the project team. We agree with the comment from the Commission.

It is proposed to omit the junction between floor and the external wall in the new standardised method, because of difficulties, beside the issues in relation to field of application considerations, but also with standardisation of assessing the junction itself.

The inclusion of floor-to-external wall junction is a compartmentation matter, and its inclusion would be inappropriate in a façade test. (Perhaps its inclusion in EN 1365 for floors would be more appropriate.)

Development of the European assessment method may be facilitated by focussing on provision and performance of cavity barriers within the façade construction (at floor level, to limit fire spread in a cavity, and provide compartmentation, where required).

Reply from Stakeholders

This consideration of the wall/floor junction is largely dealt with by fire resistance testing and may here introduce additional complexity which is not needed especially as the façade test method is considering system performance and reaction to fire. This is seen as complementary too and not an inclusive part of the current approach for facades.

As already discussed in the AGF Steering group meeting this is currently done in the framework of fire resistance testing. In addition, this is not connected to the fire performance of the façade – it deals more with compartmentation inside the building. The RR has already shown, that test labs are confused as to how to handle this and as explained in the meeting this will not replace existing requirements and tests.

So this would only add to the complexity of the new assessment method and would not be useful for any regulators. Removal of this parameter is therefore recommended.

We cannot see that the floor junction can be assessed in the same way as with the Lepir II method with the method under development and even for Hungary, the use of this parameter is limited. In addition, it has to be recognised that the method developed in this project is intended for assessment of the fire behaviour of the façade and not of the resistance to fire between different floors inside the building. We would therefore strongly advise against including junction floor in the scope of the new assessment method.

We do not have comments on that, as they are new technical subjects, we prefer to let experts involved answered.

<p>NN supports the technical recommendation from the Consortium to include, if possible, the assessment of the junction between floor and external wall in the test methodology.</p> <p>We believe the work conducted by RISE will be key in understanding whether or not it makes sense to include wall to floor junction in the method.</p> <p>A solution may be for the contractor to develop a standard junction for the purpose of the test.</p> <p>If it cannot be included in the final method, we understand that many building codes require such separation to have an integrity (E) and insulation (I) for 60, 90 or 120 minutes, providing a good level of fire safety.</p>
<p>The test method should primarily determine the reaction to fire behaviour of facades. NN therefore doesn't see the need to assess the junction between the external wall and floors. We see a need to define the role of fire barrier relative to the positioning of the thermocouples related to floor heights.</p>
<p>NN agrees with the Consortium recommendation for removing the assessment of the junction between floor and external wall from the test methodology.</p> <p>The junction element is an important fire separation between floor levels and many building codes require such separation to have a classification of (R)EI 60, 90 or 120 minutes. The wood crib used as a fire source in the façade test cannot provide a constant heat exposure, comparable with the standard time-temperature curve, for sufficient time. Thus, a proper classification of the junction element is not possible.</p> <p>The junction between floor and external wall shall be properly tested and classified as part of the resistance to fire testing.</p>
<p>No, NN represents the construction product NN. We see no need to assess the junction between the external wall and floors as this does not refer to a product property. Therefore, we recommend not to include it to this test method as it is not related to the product properties only. There are too many variables and too many aspects to be assessed.</p>
<p>This consideration of the wall/floor junction is largely dealt with by fire resistance testing and may introduce additional complexity which is not needed especially as the façade test method is considering system performance in terms of reaction to fire. The fire resistance assessment is seen as complementary to and not an inclusive part of the current approach for facades.</p>
<p>The behavior of the facade at its facade / floor junction is evaluated by the LEPIR 2 test and is an integral part of French fire regulations.</p> <p>In continuation of question 2, this behavior is a determining criterion relating to the structure and not to the evaluation of the facade product alone.</p>

5. How can the Steering Group be more involved in the steering of the project?

Background: At the present all documents related to project are shared regularly. In practical terms this means that as soon as possible, all documents are uploaded on the project website, and all incoming comments are addressed in the Comments Handling Document (also available on the project website). This is the current approach to stay informed about the project, and to have influence to the steps to be taken in the further development of the project.

During the first Steering Group (SG) meeting concerns were raised about the Steering Group's ability to be involved more actively in critical steps for developing the testing method and related classification system. It was also pointed out that any modifications should be based on evidence.

The Terms of Reference and the Inception report (available on project website) of the project has foreseen three progress review meetings for the SG (i.e. week 38 2020 – week 5 2021 – week 43 2021). In addition there will be a "validation workshop" before the project will be finalised (week 2 2022).

Comment from the Commission:

The point of more active participation is noted. In practical terms this would mean "breaking up" the initially foreseen (in ToR and Inception report) SG meetings into more frequent meetings with more focused topics.

Change of the planning foreseen in the ToR and the Inception report would improve the transparency of the project, and enable the SG to be more actively involved in the project. The drawback however will be that this is likely to extend the time to move from one phase to the following in order to make progress with the project. This would eventually result in a delay of the overall project realisation.

Reply to question 5:

Reply from Member States

"Breaking up" the initially foreseen SG meetings into more frequent meetings with more focused topics and in between questionnaires would be welcomed.

The project manager should inform the SG when new important information/need for opinion is available on the project website and give deadline for comments. Based on the comments/opinions received, the Commission representative(s) together with the project team should make conclusions or invite a short SG meeting if straight forward conclusions are not possible.

We are satisfied with the work of Steering Group and communication from its side. We welcome answers to our individual questions from theoretical round robin. We expect the results of practical round robin, which will show us the right direction in testing this type of construction.

At this moment we have two fundamental questions and the answers are important for us:

1. How shall the tested rig look like? At this moment there are not any rules for this rig. Will it depend on each laboratory? (choice of profiles, dimensions, protection of frame/unprotected frame...).
2. Is it necessary to use the measurements of wooden crib during tests on each test specimen? We hope that this parameter is only information for theoretical topic of this project. The results of burning is not used for evaluation of the test.

We support the current scheme suggested in the ToR and Inception report.
The final test method requires broad approval and acceptance from all stakeholders, so participation must be given sufficient attention. We cannot answer exactly what is necessary.
We did not participate in the meetings that took place within this project, meaning that we cannot formulate a point of view regarding a more active involvement of the SG in the process of elaborating the technical evaluation.
More intensive involvement of the Steering Group and more frequent meetings are very welcomed by NN. It would be very helpful to develop the new test method in such way that Member States finally allows to accept this test and assessment method as appropriate with regard to the relevant fire safety requirements in their national regulations. Considering this aspect, a slight delay of the project realisation is tolerable with regard to the desired Member State's acceptance of the coming European test approach.
No particular opinion on this aspect.
To continue to upload all applicable documents, and after important phases are finished feedback meetings shall be organised.
In NN, we do not have an interested group that would actively monitor the development of the facade standard. Maybe just someone from the fire laboratory NN.
The current procedure is suitable for us.
We support the fact that inclusion of too many parties (stakeholders) into project progress will extend the time to move from one phase to the following in order to make progress with the project. This would eventually result in a delay of the overall project realisation. The project leader (RISE) and all involved partners have enough experience in this field to find optimal solution.
Briefing meetings, such as that held on 1st December, 2020 may be useful – for the Project Team, SG and Member States.

Reply from Stakeholders

A reasonable delay in the finalisation of the project would not be as problematic as not having given the chance to all the interested stakeholders to adequately contribute to the project. In light of the sanitary emergency, which is directly and indirectly impacting also the advancement of this project, we support the proposal to enable a more active involvement of the SG in the various phases and discussions related to this project.
We see at least 5 upcoming milestones that should be made very transparent and involve the steering group: <ol style="list-style-type: none"> 1. Update of the assessment method before the experimental round robin (October 2020) 2. Any subsequent updates of the assessment method 3. Decision on test specimens for experimental round robin (December 2020) 4. Decision about the need to apply the secondary opening, especially for the medium exposure, and about the need to test the floor junction 5. Drafting, development and update of the classification system

For the update of the method, we consider that any deviation from the BS and DIN standards should be justified and agreed. There have been several changes introduced in the first draft of the assessment method without clear justification which might have a major impact (for example position of thermocouples and levels for classification, inclusion of lateral flame spread).

We introduced several comments and questions on these changes but mainly got as answer: "this is not final". Other participants raised concerns about the impact of the changes on the comparability of the method with historical data and the robustness of the method.

For the test specimens, it has now been clarified that the aim is to select systems that are borderline according to the BS and DIN test in order to calibrate the method. Historical data will be used for this purpose. We welcome this clarification and this is one more reason to avoid unnecessary changes. It should similarly be clarified that some parameters, in particular the position of thermocouples and temperature limits that are currently "not final", will be determined based on this calibration and to achieve similar results to existing BS and DIN test.

There is also a wish by the project team to be supported by the industry for the supply of the test specimens. But this aspect should not guide the decision for their selection. A transparent science based selection must be achieved. The selection of test specimens should be openly discussed within the stakeholder group and the steering committee. In general, all information used to support the decision in this project should be shared transparently. It is also the case for parallel test programmes: if such programmes are run confidentially they should not be considered by this project. Only the information about specific materials and formulations may be considered confidential.

We stand the view that if a little delay in the project is introduced but leads to a much improved European assessment method (thanks to increased engagement with stakeholders), all the better for its outcome. Therefore we support having detailed discussions on the important steps of the project. In particular regarding the details of the new assessment method and the further selection of the specimens to be tested in Round Robin program. We believe that those having experience regarding the performance of currently approved façade systems can contribute very valuable knowledge.

We do not have comments on that, as they are new technical subjects, we prefer to let experts involved answered.

NN commend the Consortium and Commission for providing a good level of transparency, openness and consultation of stakeholders. We welcome the Consortium's decision to publish and regularly update project documents on the project website, organise webinars and be available to attend meetings with stakeholders.

NN believes that the Consortium has an adequate level of technical expertise, testing experience, understanding of fire dynamics and fire behaviour of façade to take technical decisions needed for the development of the test method within the framework defined in the ToR and considering all the inputs received from stakeholders (webinars, comments handling, stakeholder meetings). As such, we consider that the project offers sufficient means for stakeholder involvement and the SG meetings foreseen in the ToR (i.e. week 38 2020 – week 5 2021 – week 43 2021 – workshop in week 2 2022) are adequate for the project.

NN is of the opinion that the following measures are necessary:

- Rapid inclusion of all comments received, as promised in the inception report. Currently the list remained unchanged for three months, although many comments have been received meanwhile.
- Timely answers in the comments list to the questions and comments received. Answers need to be handled before entering the next stage of testing as the decision on several questions might have impact on the following test design.
- Conclusions going from one of the main phases of the project to the next, requires that the conclusions from this phase are discussed and confirmed by the steering group. The meeting schedule therefore needs to be adapted, including additional (conference call) meetings to enable this. If this delays the project to some extent, this consequence shall be accepted.
- Introduction of a transparent change management process monitored by the steering group for the main documents such as test method and classification method.
- Changes require a substantial technical and scientific justification.
- At any stage of the process it must be clear, which is the version of the documents used by the project team to prepare and to perform the next stages.

NN experiences that both the Consortium and Commission have taken the necessary actions to ensure an appropriate level of transparency, openness and collaboration with all stakeholder interested in the project. The Consortium decision to published and update documents on the project website, organize webinars and extend availability for attending stakeholder dialogue meetings offer the necessary tools to follow the development of the project and provide technical input.

We believe that the Consortium selected to conduct this project has a high level of technical expertise, testing experience, knowledge and understanding of fire dynamics and façade behaviour during fires to take technical decisions needed for the development of the test method within the framework defined in the ToR and considering all the inputs received from stakeholders (webinars, comments handling, stakeholder meetings). As such, we consider that the project offers sufficient means for stakeholder involvement and the SG meetings foreseen in the ToR (i.e. week 38 2020 – week 5 2021 – week 43 2021 – workshop in week 2 2022) are adequate for the project.

We regard the following measures necessary:

- a. Rapid inclusion of all comments received, as promised in the inception report. Currently the list remained unchanged for three months, although many comments have been received meanwhile.
- b. Timely answers in the comments list to the questions and comments received. Answers need to be handled before entering the next stage of testing as the decision on several questions might have impact on the following test design.
- c. Introduction of a transparent change management process monitored by the steering group. Follow-up needs to be done in shorter terms than originally scheduled to take relevant decisions ahead of entering next stages of the project.
- d. Changes require a sustainable technical and scientific approval.
- e. At any stage of the process it must be clear, which is the relevant document used by the project team to prepare and to perform the next stages.

f. The (non-public) contract between the Commission and the consortium should not allow for deviations from the tender without approval from the steering group.

Question for clarification:

In which document do we find the Terms of Reference (ToR) mentioned above in the comment from the Commission?

While the risk of increasing the time-scale of the project is a significant factor to consider, it is clear that the quality of the output from this type of project will be remembered long after the delivery timetable of the project. Accordingly, since greater stakeholder engagement has the prospect of leading to a more considered outcome, we would certainly support more regular points of engagement.

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6. What failure criteria shall be used for falling parts?

Background: Falling parts will be a part of the classification and it is therefore necessary to define the failure criteria to be used. Safe escape of inhabitants and safe access for fire rescue services is a common basis for regulations, as well as fire spread downwards. There are in principle three different items that can be assessed, the weight of falling parts, the geometrical size of falling parts, and continuous flaming of falling parts.

In the present national test methods, falling parts are generally assessed through visual observation. This is not advisable due to poor repeatability and reproducibility. Therefore, some technique is needed to measure quantitatively the parameters to be used to assess falling parts. Possible techniques to measure the weight of falling parts and continuous flaming of falling parts have been identified. There are also different techniques using image analysis to determine size of falling parts, but these are quite complicated, and the resolution achieved is questionable. Due to flaming and smoke production in front of the test specimen it would be very difficult to use these techniques with enough precision.

The most recent suggestion from the project team is to focus on measurement of the weight of falling parts on the one hand, and on observation of continuous flaming of parts fallen on the ground on the other hand. In both cases, no more difference would be made between solid or liquid parts.

The criterion on weight of falling parts can be the weight of individual parts that falls down, and it could also be an accumulated weight during the test.

Regarding the continuous flaming of falling parts a similar criterion as is used in fire resistance can be applied, i.e. the time of the flame shall not be longer than a prescribed time (10 or 20 seconds) for parts fallen on the floor. To measure the size of the burning part is difficult and it is therefore suggested that only the burning time is used.

Comment from the Commission:

No comment.

Reply to question 6:

Reply from Member States

We welcome the attempt to assess falling parts not through visual observation due to the poor repeatability and reproducibility of the method. From the point of view of an uncomplicated technical solution we agree that measuring the weight of individual parts that falls down or in general measuring the accumulated weight during the test could be a solution to define a failure criteria.

In NN requirements for certain types of building it is required that "Falling of large parts of the facade structure in the event of a fire must be restricted." However, no dimensions are given. Neither flaming of falling parts is given as criteria. Thus, based on the project team's two suggestions, the weight of falling parts (weight of individual parts and accumulated weight) would be the preferred method to define failure criteria for falling parts. Additional suggestion: Could it be possible to define also the acceptable distance from the test apparatus where the falling parts land! Or possibly define the potential ability of falling parts to fly away from the façade (based on area/thickness ratio). This would help in avoiding flying parts causing danger far from the burning façade (e.g. flying plates and boards).

Definitely we support evaluation of falling parts and we also agree with the proposed evaluation procedure (visual observation and measurement). We are ready to use supporting method of weight and size evaluation of falling parts, because we are aware of the difficulties associated with weight of falling parts, especially when they are burning. Falling parts can also split into pieces and the method of weighing can be little bit subjective.

We support the suggestions from the project. For classification, the weight of the biggest (most dangerous) falling part is sufficient and the accumulated weight during the test is not needed and probably also more difficult to measure.

From our point of view, the falling parts are of secondary importance. It is imperative to prevent large parts of the facade system from falling off (about 1/4 of the area of the test specimen or more). This should be ensured with a relatively rough measurement and classification.

For falling parts shall be used criteria regarding total weight, the spread of particles in function with height of the construction and continuous flaming.

From the NN regulatory point of view the occurrence of burning droplets / burning falling parts and its assessment is mainly relevant. This characteristic can be assessed by measuring the (accumulated) time of occurrence and the size of an initiated secondary fire on the floor in front of the test rig (e. g. by using markings on the floor).

However, the size of a concerned area of the tested façade should also be considered within the assessment of falling parts (not burning) caused by mechanical collapsing. A limitation of this size to that area of the façade being directly exposed by the flames of the primary fire source seems to be suitable as assessment criteria. From representatives of NN fire brigades, it was frequently stated that fire brigades are able to handle mechanical collapsing and falling parts of facades if limited to the directly fire exposed area. But it is very problematic, if mechanical collapsing and falling parts occur in areas far away from the original fire exposure and without visible flame impact.

Independent from that, the assessment of the fire safety of fixings of facades (e. g. curtain walls) on the loadbearing structure inside the building shall be done within the assessment of the fire resistance of the surrounding room-closing walls and ceilings of the place of the fire origin (cf. answer to question no. 4).

This is a difficult aspect to treat, because the danger is related to the impact of the falling object and thus its energy and the contact surface at the moment of the collision. A small lightweight part falling from 50 m high can have a similar impact energy than a large heavy part falling from 5 m high.

Discussions in NN to establish criteria were not conclusive. It seems impossible to define criteria that have a sound scientific basis.

It is important to measure and observe falling parts because of safety of people (residents and firefighters). The main idea of burning parts can be if they can ignite any easily burning material – if they can – the façade is not safe. From our point of view – any flaming parts are not ok higher classification, but it can be ok for lower classes. Criteria regarding flaming parts can be taken from already existing EN standards – for example EN 13501-1 – d0 classification no flaming droplets within specified time, d1 – flaming parts longer than 10 seconds, and d2 – NPD. As it is mentioned in the standards - to analyse flaming parts – high-resolution camera also can be used.

The size of the individual falling part is important. Maybe can be assessed after watching the footage (recording of the testing has to be mandatory)?

We hold the opinion that this decision should fall to the project team.

It is proposed that failure criteria for falling parts include total weight and duration of continuous flaming. Care should be taken to determine the total mass of the parts as it decreases with combustion and increases with water intake during extinguishing the sample.

Consider weight and burning time – as suggested by the Project Team. The weight of individual falling parts, and the accumulated weight during the test, may be appropriate. The maximum size of individual parts should also be noted.

Reply from Stakeholders

It is essential to obtain that the method is developed on a way that material which reaches the ground of the laboratory (falling parts) is not close to the combustion chamber as:

- Observation of size as well as of burning particles and/or burning droplets will be difficult;
- It could be influenced by radiation originating from the combustion chamber that may cause self-ignition, while that will not happen in the unlike event of a fire which occurs on a floor of a building. Thus, it is necessary to ensure the correct **uplift of the test rig**.

NN agrees on the principle of weighing individual falling parts as the total amount of falling parts is not significant for the purposes of the safe evacuation of people and safe intervention of fire fighters. As a matter of fact, it is not the total amount of falling parts in relation to shape (hazardousness) that reflects danger for occupants and firefighters, but the mass by size/shape of the falling parts themselves. The mass results in the impact due to gravity. However, a larger area, e. g. 1-2 m² of textile fabric, which waves down “like a leaf” would be less dangerous than a dagger-shaped piece having a mass of 0,5 kg. Hence, NN recommends eliminating the mass and area limitations alone and **introduce a factor like mass/area instead**.

Furthermore, building entrances have covering above them and protection from falling parts is assumed in those areas. Thus, it is advised to **raise the limit for failure to a mass that would be proportionate with the type of testing** (e.g. the Austrian standard ÖN 3800-5 for intermediate scale test allows up to 5 kg). In any case, the critical amount of falling parts should be defined after the test series. An **incremental weighing system** allowing the continuous monitoring and weighing of falling parts must be used during the test.

As per the burning debris, it should be acceptable the presence of burning debris inside the control zone for a longer time than 10/20 seconds (e.g. 60 seconds). What would pose additional risks is the presence of burning debris far away from the façade, posing additional risks to the surrounding buildings, objects, people. Thus, it is proposed to **define a control zone** and to focus the attention on burning debris outside the control zone, more than inside the control zone.

This needs to be discussed in more detail.

The repeatability and reproducibility of falling parts during such a test is at the moment unknown and need to be fully determined on a research basis. To evaluate this in detail, this would need a lot of tests, whose amplitude will not be completely covered by the scope of this project.

The burning times can only be determined by visual observation and might be erroneous as stated before.

In order to allow progress of the project even if the above mentioned issues for falling parts cannot be solved within this project, we recommend to leave this in the observations in the test report without applying this parameter for the classification.

We believe that this needs to be discussed in more detail as even a façade comprised with non-combustible cladding parts could be falling down. In addition, falling parts could happen in one test and not happen in the next one. Regarding the burning times, and as indicated in the background introduction to this question, we do not see how today that can be determined by another way than a visual observation but stand ready to engage on this issue in order to reduce the likely of errors.

In any case we recommend to leave this information in the observation part of the test report without applying this parameter for the classification.

We do not have comments on that, as they are new technical subjects, we prefer to let experts involved answered.

NN supports the technical recommendation from the Consortium to focus on measurement of the weight of falling parts and observe the continuous flaming of falling parts. We also welcome the proposal of a quantitative measurement technique to improve repeatability and reproducibility of the test method.

It is essential that the measurement technique used in the test can determine aspects such as burning droplets, weight and size of falling parts.

NN also proposes limiting the observation of falling parts to the early phase of the fire test, when there is a potentially higher risk of the fire propagating via falling parts.

The project team proposed a solution which is not satisfactory and there is no correlation to the actual risk of falling parts. The quantified parameters mentioned so far (see Assessment method draft revision 1) are not backed up by technical and scientific evidence and their acceptance by Member States varies considerably.

NN proposes the following route to achieve European harmonized failure criteria for falling parts:

- a) Search for the real risk in case of fire depending on the mass, the size and the heat release of falling particles
- b) Proposal of quantified parameters and their discussion with Member States
- c) Specifications based on the results which satisfy all national requirements or views on the matter
- d) Identification of the technical possibilities for testing these parameters
- e) Clarification and discussion of how to deal with values measured on the floor of the test room, which on the one hand are in the radiation area of the test fire, i. e. can subsequently ignite, which in a real fire case they would only do in a fire on the ground floor. On the other hand, falling parts can influence the intended burning of the test fire.
- f) Verify the repeatability of test results to the falling parts by comparative tests

g) Definition and publication of the criteria of falling parts

NN agrees with the technical proposal from the Consortium to focus the project on developing a quantitative measurement for the weight of falling parts and burning droplets. We recommend that the measurement technique shall be able to determine:

- i) all burning droplets that continue to burn when falling on the ground (e.g ≥ 10 seconds)
- ii) The weight of the individual parts that fall on the ground. If necessary, size of falling parts can be further assessed based on the weight registered for each individual part and the material information (density, thickness, etc.) of the main components of the façade system.

One cannot answer the question regarding failure criteria yet as from our point of view the proposed solution is not satisfactory. Therefore, we reject the proposed solution. The quantified parameters mentioned so far (see Assessment method draft revision 1) are not backed up by technical and scientific evidence and their acceptance by Member States varies considerably.

We assume that the following route needs to be taken to achieve European harmonized failure criteria for falling parts:

- a. Search for the real risk in case of fire depending on the mass, the size and the heat release of falling particles
- b. Proposal of quantified parameters and their discussion with Member States
- c. Specifications based on the results which satisfy all national requirements or views on that matter
- d. Identification of the technical possibilities for testing these parameters
- e. Clarification and discussion of how to deal with values measured on the floor of the test room, which on the one hand are in the radiation area of the test fire, i. e. can subsequently ignite, which in a real fire case they would only do in a fire on the ground floor. On the other hand, falling parts can influence the intended burning of the test fire.
- f. Determination of the repeatability of test results regarding the falling parts by comparative tests
- g. Definition and publication of the criteria for falling parts

To conclude: we support the approach of the project team to find a methodology to quantify falling parts. However, first Member States' requirements need to be evaluated (which criteria are relevant?), then the methods need to be developed to quantify it. Only after that failure criteria and classification (if needed) can be evaluated. NN will be willing to support.

NN sees the issue of falling debris as one of real significance in fire situations and needs to be properly assessed by the best available techniques. However, it is probably beyond the scope of this project to seek to develop or significantly hone approaches that have already proved difficult to apply and which can lead to non-reproducible results. Therefore, we would propose that reporting visual observations in the report should be a mandatory requirement with comment being made on any continuous flaming and some qualitative description of the size and shape of the falling debris as well as some indication of the material of which the debris is composed. However, the information should stop short of any attempt at quantification until a reliable

method is found. Without quantification, it may not be possible to implement any pass/fail criteria at this stage.

Beyond all the measurement techniques that may be proposed (weight, surface area, ignited debris), the intrinsic dangerousness of falling debris will always remain difficult to assess and therefore to regulate due to the situations specific to each fire.

Even small debris falls can for example injure by their unit weight (pieces of cladding) or by their sharp nature (shards of glass)

Should this parameter be regulated or limited to the sole visual observation of the findings transcribed in the test report? The question will have to be dealt with as the European trials progress for a relevant decision at the end of the experimental phase.