COMMENTS HANDLING DOCUMENT – VERSION 2 – OCTOBER 23, 2020

In the following table are all written comments received during the project assembled. An explanation to the columns used are as follows:

Column 1 – Nº: Numbering of comments
Column 2 – Body Reference: The body who have given the comment
Column 3 – Comment on document: A reference to which document the comment belongs
Column 4 – Paragraph/Figure/Table: A reference to which part of the document the comment belongs
Column 5 – Comment: The comment received
Column 6 – Proposed change
Column 7 – Answer by the consortium: A short description on how the comment has been handled

The answers given by the consortium in this document are valid for the time they were written, but the answers may change during the course of the project.

The table below lists the comments that have been handled after the publishing of Version 1 of the Comments Handling Document, dated July 22, 2020.

Nº	Body Reference	Comment on document	Paragraph/ Figure/ Table	Comment	Proposed change	Answer by consortium
5	European Aluminum	AM May 7, 2020	3	The definition of façade also includes curtain wall, which is outside the scope of the method. It is proposed that curtain wall is removed in this definition.		The question whether curtain walls shall be addressed in the method or not has been sent to the Steering Group of the project.
7	FSEU	2020-06-12	Assessment method Sec 7.4	The document refers to EN 1364-3 and EN 1364-4 for curtain wall systems. On the other hand it describes a method for façade-to-floor junction which looks similar to the detail of a curtain wall perimeter joint/junction as covered by EN 1364-3 or EN 1364-4. To avoid a misuse		The question whether façade to floor junction shall be addressed in the method or not has been sent to the Steering Group of the project.

				of this document for curtain wall testing or parts of it we propose to delete the floor-to-wall option as in 7.4. and refer to EN 1364-3 and EN1364-3. Such "junctions" in practice will always require a certain movement capability based on wind loads, traffic loads, etc., which is also not considered in this document. In case the "Façade-to-floor junction" will not be excluded, the performance criteria in 11.3 needs to be adapted to the criteria acc. to EN 1364-3 or EN 1364-4. Why is a 10 second continuous flaming for integrity performance accepted ?		
8	FSEU	2020-06-12	Assessment method Sec. 6.2	The definition uses the terms "fire barrier" and also "fire stop". In 6.2 also the term "cavity barrier" is used. We propose just to replace the term "fire stop" with "fire barrier" or "cavity barrier" in order to avoid confusion.		Agree, we have to adopt the same wording throughout the document, and it shall be the one used in the definitions. The proposal is to make a definition of "fire barrier" where we explain that it covers all types of barriers, i.e. fire stops and cavity barriers.
9	FSEU	2020-06-12	Assessment method 6.2	In 6.2 it says: One specimen shall be tested. In the case where the mounting can be made in different ways (e.g. panels mounted vertically or horizontally), or where different details can be used (e.g. different types of fire stops or cavity barriers), or		Agree, but it must be clearer that this also depends on the field of application. Changes will be made in the assessment method, both in the scope as well as in the chapter on the number of test specimens..

				where other features can be done in different ways, then additional test specimens may be required. The word "may" has to be replaced by "shall". It needs to be clear that it should be mandatory to include each different detail in a test and also that these details are part of the entire façade system - if not covered by the field of application.		
10	European Aluminium	2020-06-16	3. Terms, definition,.. Definition of "Façade" "A complete external wall construction of any type (massive wall or curtain wall …etc.) or constitution (masonry, combustible material …etc.)"	Delete reference to curtain wall, as it clarified in many other sections of the document that curtain walls are not in the scope of this work		The question whether curtain walls shall be aggressed in the method or not has been sent to the Steering Group of the project.
23	Paroc	2020-06-17	Façade systems to be tested general	What does belong to a façade system? Is there a clear description of the terminology and what it includes?		There is no clear definition of a façade system, and it becomes even more unclear on what to include in a test when looking on the regulations in the MS. In some MS the regulation covers the complete exterior wall, while in other MS it is the outer skin that

						needs to be assessed. Therefore, the European assessment method needs to cover all, and it will be important to have a good description of the field of application together with the test and classification report. Since there is no general definition available on the term façade or a façade system, it is used in a very general way in this document.
25	Paroc	2020-06-17	Façade systems to be tested Fig 2/ p. 3	Do floor and ceiling belong to a façade system? we think that it should not be part of the tested specimen because the purpose of the test is not to test the whole construction		The question whether the façade to floor junction shall be part of the assessment method has been sent to the steering group.
31	Paroc	2020-06-17	Façade systems to be tested Fig.5/p.7	Do floor and ceiling belong to a façade system? we thing that it should not be part of the tested specimen because the purpose of the test is not to test the whole construction		The question whether the façade to floor junction shall be part of the assessment method has been sent to the steering group.
74	EPFA	2020-07-01	Façade systems to be tested - Inert facades	If the intention of testing an inert facade system is primarily for the determination of falling debris, then the current proposed test method offers no guidance on how the weight of any part falling from the facade shall be separated from any partially burnt timber falling from the crib. Equally, there is a need to record the typical size of any falling debris, since this will be a significant factor in consequential risk to those in the vicinity of the fire. We would propose that a robust method is placed in the		Noted. The tests on the inert facade are part of the calibration procedure. Based on the results obtained the project team will be able to make judgements regarding the measurement repeatability. At present the project team is investigating various measurements options to assess the falling parts to ensure that we will obtain a reliable and repeatable result (to a certain extent). A more refined view of the measurement techniques will be available after the calibration exercise. The aim is to have a measurement technique enabling measurements during the test, i.e. weight, size and time of each individual falling part will be registered.

				test procedure for the purposes of recording the weight and average size of falling debris from the system being tested and separate it from debris arising from the timber crib. Such details should be applicable to all façade systems. It is also critical when assessing the weight of falling debris that account is taken to deduct the weight of any water which has been used in the extinguishment of the crib and façade at the end of the test.		Regarding failure criteria and thus also what to measure a question has been sent to the Steering Group.
75	EPFA	2020-07-01	Façade systems to be tested - Combustible rain screen	To satisfy the stated intention of testing borderline cases, consider changing the insulation being proposed for this test. To achieve this, we would suggest that the mineral fibre insulation currently proposed in the this test is substituted by a commonly used thermosetting insulant such as phenolic foam, as per our comment #8 above.		Noted. This will be discussed within the consortium. The aim is to use facade systems that have been tested through national testing standards. To be discussed further after initial tests and fixed position of thermocouples.
76	EPFA	2020-07-01	Façade systems to be tested - ETICS	If the intention of the test programme is to assess both vertical and horizontal fire spread on both the surface and within the facade system, consider testing a system with		Noted. This will be discussed within the project task group. We agree that a borderline system for large exposure may not have the same behaviour when subjected to the medium exposure procedure. The facade systems will be carefully discussed and

				EPS in the medium fire load as a borderline system and a phenolic system in the high fire load. This would be expected to provide information on two different systems with two different performance levels.		selected in such way that we maximise the data collected during the experiments. Your suggestions will be considered.
78	EPFA	2020-07-01	Early termination of test Section 10.7 of test method	Whilst we appreciate the reasons for terminating the test once flaming has spread beyond the limits of the test rig, the fact that the height of the rig has not been set (apart from stipulating a minimum height of 6m above the combustion chamber opening) allows an infinite variation for this parameter. We would urge you to consider the decisions reached at BSI on standardising the height of the BS 8414 test to 7.7 ± 0.1m above the combustion chamber and to introduce this change before the commencement of the test programme. This change would enable the determination of early termination to be consistent and standardised.		Noted. We are aware of the changes in the revised version of BS8414-2020 regarding the test rig height. These changes and their potential impact are discussed at the moment within the project task group. We are not aiming for larger heights of the test rig. Thermocouples will be used to examine the temperatures and flame spread. Therefore visual observations of the flame spread will not be used since visual observations have a very low repeatability and reproducability.
80	EURIMA	Assessment method - draft 1 dated May 7 2020 - SI 2 825082.pdf	Paragraph 5.1	The test method describes in paragraph 5.1 that the ambient air velocity is measured only before the test. If this test will be performed outdoor it is necessary to		Agree. It will be discussed in the project task group the potential of introducing supplementary air velocity measurements for the tests performed outdoors. At present the project will work in the following direction. The position of the wind speed measurement will be moved further

				monitor wind velocity and direction also during the test. The wind velocity and direction can change or fluctuate significantly during the test and this will influence the results of the fire test.		away from the test rig, and measurements will be done during the whole test. Some criteria shall be set on the acceptable wind speeds. A continuous wind of more than X m/s for a duration of 1 minute will fail the test.
81	EURIMA	Assessment method - draft 1 dated May 7 2020 - SI 2 825082.pdf	Paragraph 7.2.1 Figure 9	It is known that for many traditional buildings in European countries, existing buildings that are in use today, a typical spandrel height of 1.2-1.3 m is used. A difference of 30 cm in the flame region can have a significant influence of the behaviour of the façade around the window opening. The proposed 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.		Agree. The intent is that the assessment methodology may be applicable for as-build (existing) façade systems. We will consider this comment. A new proposal on the floor levels will be introduced in the method. A drawing shall be made showing the floor levels. At present a distance between floor levels of 2,9 m is proposed.
82	EURIMA	Assessment method - draft 1 dated May 7 2020 - SI 2 825082.pdf	Paragraph 9, Figure 12, and Figure 13	Design guides and regulations for the design of facades require that installation of fire barriers in continuation of the floor slab. This detail is important for the test method in as the location of fire barriers on the test rig will also influence the temperature measurements. As such, it is important that the test method describes with sufficient precision the location of the floor (slab) on the test rig in order to ensure		Noted. Currently the assessment methodology offers the option of incorporating fire stopping details at the top of the combustion chamber. There is no intent to incorporate other floor slabs and fire stopping details on other levels of the test rig. The cavity barriers and the fire breaks (depending on the tested system) will be installed as per manufacturer's/ test sponsor specification to reflect as close as possible the current practice installation procedures. A drawing will be introduced where the floor levels are shown. See also comment 81 above.

				that the test reflects the details of the façade installed in reality. Such information shall be precisely described in Paragraph 9, Figure 12 and Figure 13.		
83	EURIMA	Façade systems to be tested	Initial tests Questions to stakeholders:	We agree with the proposed system. However, we wonder why to use a facade system that is not representative of widely used system? Why to choose a wooden façade when they are not common for multi-story buildings? Do floor and ceiling belong to the façade system? We think that it should not be part of the tested specimen because the purpose of the test is not to test the whole construction What could be a mineral fiber Euroclass D? Or is it wood fiber insulation if euroclass D is requested? wood fiber insulation is not used in multi-story buildings. If linear fire stopping at floor level is to be considered the location of the junction should be considered carefully same as secondary opening to be representative i.e. Right above the crib seems unlikely		The choice of façade systems has been made to have very different types of systems, and all are used in practice. There is a difference between Member States on the systems most frequently used, and wooden facades are commonly used in northern Europe. In order to answer to requirements of national regulation of some MS, the connection between the façade system and the floor shall be assessed. In such case this connection is reproduced by installing the representative floor/ceiling in lieu et place of the combustion chamber ceiling. A question regarding the optional evaluation of the floor/external wall junction has been sent to the Steering Committee. Regarding Euroclass on materials used in the initial tests and the experimental round robin, nothing has been decided. We appreciate recommendations and suggestions from industries that have experience in testing of the different proposed general façade types. Cavity barrier/fire barriers and other important details used in the façade system in order to prevent fire spread can be used in the test, and they shall then be applied as in practice. Drawings showing the floor levels will be introduced which may in certain cases be of help when deciding where to place fire barriers. The placement will be based on the

				Secondary opening should be a representative distance for research/ baseline testing. In our view, this is not the case for the 1,5 m proposed.		manufacturer/test sponsor specifications to reflect the current practice installation. The position of the secondary opening has net yet been set, and will be part of the initial testing program.
85	EURIMA	Façade systems to be tested	Inert façade Questions to stakeholders	For the purpose described in the document, it is recommended to use inert façade cladding made of fibre cement. Fibre cement boards are inert surfaces that are being used on the market as rainscreen claddings in combination with both non-combustible and combustible insulations. We recommend to consider heavier facades such a corium brick slip as they could fall off quicker and cause more damage		OK thank well noted we will look at such possibility
87	EURIMA	Façade systems to be tested	Combustible rain screen and non-combustible insulation Questions to stakeholders:	Installation instruction for HPL boards recommend minimum 10 mm joints. Thus, it is recommended that the fire test will be conducted on a system with a 10 mm HPL boards installed with 10 mm joints. For a borderline system thicker HPL boards (10 mm) are recommended as thicker boards have a higher thermal inertia which will delay the ignition/combustion of the board.		OK well noted.
88	EURIMA	Façade systems to be tested	Combustible rain screen and non-	When installing on a wooden sub construction, often a vapour open foil is used. The		Questions regarding the experimental round robin will be discussed together with the steering group. The decisions on the design of

			combustible insulation Questions to stakeholders:	standard vapour open foil used is not classified. To eliminate the need to an vapour open and the influence of such combustible element it is recommended that the HPL boards are installed using aluminium. fixing metalwork, which is a common installation method for rains screen facades.		test specimens for the experimental round robin will be made later this year or beginning of 2021. We appreciate all suggestions and proposals on suitable designs which fits the aim of the exercise.
91	EURIMA	Façade systems to be tested	Combustible rain screen and non-combustible insulation	EURIMA will like to reiterate its' support for the project and provide donations of mineral wool insulation products necessary for the testing of this type of façade system.		Thank you, it is much appreciated
94		Façade systems to be tested	Ventilated wooden façade Questions to stakeholders	Agree with the proposed system. It is acknowledged that the test method shall be applicable for all types of façade systems that can be installed on buildings. For this purpose the proposed system is important to be evaluated. However, we do not recognize this type of construction as being used in multi-story buildings across Europe. Do floor and ceiling belong to a façade system ? we think that it should not be part of the tested specimen because the purpose of the test is not to test the whole construction. What could be a mineral fiber Euroclass		Questions regarding the experimental round robin will be discussed together with the steering group. The decisions on the design of test specimens for the experimental round robin will be made later this year or beginning of 2021. We appreciate all suggestions and proposals on suitable designs which fits the aim of the exercise.

				D? Or is it wood fiber insulation if euroclass D is requested? wood fiber insulation is not not used in multi-story buildings.		
98	MBA	Façade systems to be tested	Figure 4. Example on an ETICS with combustible insulation. Questions to stakeholders: Is the suggested test specimen a good alternative, or do you have any other suggestion? Are there any details in the suggested test specimen that should be changed to give the desired result?			Questions regarding the experimental round robin will be discussed together with the steering group. The decisions on the design of test specimens for the experimental round robin will be made later this year or beginning of 2021. We appreciate all suggestions and proposals on suitable designs which fits the aim of the exercise.
99	MBA	Façade systems to be tested	Figure 5. Example of test specimen for round robin on ventilated			Questions regarding the experimental round robin will be discussed together with the steering group. The decisions on the design of test specimens for the experimental round robin will be made later this year or beginning of 2021. We appreciate all suggestions and

			wooden facade. Questions to stakeholders: Is the suggested test specimen a good alternative, or do you have any other suggestion? Are there any details in the suggested test specimen that should be changed to give the desired result?			proposals on suitable designs which fits the aim of the exercise.
103	MBA	Inception report	Table 18	Outdoor testing is not easily controllable. Resources would be better spent on the optimization of the internal testing and external testing could be developed in a later phase.		The question is not whether the test is done "indoor" or "outdoor", since that is a very imprecise definition. A lab can have smoke ventilators on the roof which are open during the test (it could thus rain on the test specimen), you can be outdoors and have a roof above the test site. There are many different alternatives. Also, indoors you may have "strong" winds due to the ventilation system. Therefore, we will look on the

						requirements on the environmental conditions, and it is then up to the lab to find out the best solution at their premises.
106	European Aluminium	Facade systems to be tested.pdf	Experimental round robin → Inert façade system	Almost all ventilated systems have issues with falling parts. Thus, European Aluminium made a proposal for an inert ventilated façade with solid aluminium cladding. Indicative description of the components of the façade solution offered: • Ventilated façade system • External cladding – cassettes, solid aluminium (2mm) • Supporting system – Aluminium profiles • Fixing brackets – Aluminium profiles • Wall fixations – Screws + plastic anchors • Joints – open joints • Insulation – Rockwool (180mm thickness) • Horizontal fire barriers w/o intumescent at each level • Edges of specimen closed Using the proposed solution together with the necessary improvements would make possible to observe falling parts both in solid form and liquid form (while this would not be possible with e.g. light concrete solutions).		Well noted. The selection of the façade systems to be tested will be selected together with the Steering Group, and the decisions will as far as possible be based on historical test data, preferable from test performed with either the BS or the DIN methods.

107	European Aluminium	Facade systems to be tested.pdf	Experimental round robin → Combustible rain screen and non-combustible insulation	HPL per se withstand a fire for a certain period. However, in combination with timber substructure, this system is mainly used for low rise buildings. In order to achieve the desired effects regarding horizontal and vertical fire spread, we suggest using a system which might be suitable to be used for high-rise buildings and use a non-combustible sub-construction. Alternatively, a EN 13501-1 Class B aluminium composite panel as combustible rain screen might be suitable (European Aluminium could directly engage in the development of such solution).		This option will be also considered. The selection of the façade systems to be tested will be selected together with the Steering Group, and the decisions will as far as possible be based on historical test data, preferable from test performed with either the BS or the DIN methods.
110	European Aluminium	Assessment method - draft 1 dated May 7 2020 - SI 2 825082.pdf	11.1 Fire spread	From our extended experience with temperature measurements according to BS 8414, we have concerns that the position and temperature criteria of 500K is not suitable for the evaluation of vertical flame spread. Depending on the tolerances in the fire source (timber crib) the value of 500K is reached by almost every inert facade. Hence, we suggest to have a mapping over several levels (e. g. 4.5, 5.5 6.5m) and look for more accuracy on the definition of the fire source.		The criteria and measurement positions are not set at the moment, this will be investigated in the experimental program where the façade specimen will be heavily instrumented. A suggestion of suitable criteria based on the evidence from the experimental program will be supplied at the end of the project.

111	Ventilated wooden façade	9 mm wind protection (wood panel)	Figure 5	We assume that a wood fibre board is chosen WF according EN 13171 or soft board according EN 622-4 ? The external insulation system is not state of the art. Replace outer insulation + horizontal wall stud + wind protection with a rigid underlay out of WF Joint system tongue and groove Thickness ≥ 22 mm		The systems to be tested are not decided yet. The project relies on suggestions from the Stakeholder group and also that these suggested façade systems can be supplied. The selection of the façade systems to be tested will be selected together with the Steering Group, and the decisions will as far as possible be based on historical test data, preferable from test performed with either the BS or the DIN methods. Your suggestion is noted and appreciated.
122	Permasteelisa Group		General	No appropriate test and assessment criteria for unitised curtain walls are available. Will Curtain Walling be included in the method?		The question whether curtain walls shall be aggressed in the method or not has been sent to the Steering Group of the project.
123	FSEU	Façade systems to be tested	General / whole document	What does belong to a façade system? Is there a clear description of the terminology and what it includes?		There is no clear definition of a façade system, and it becomes even more unclear on what to include in a test when looking on the regulations in the MS. In some MS the regulation covers the complete exterior wall, while in other MS it is the outer skin that needs to be assessed. Therefore, the European assessment method needs to cover all, and it will be important to have a good description of the field of application together with the test and classification report. Since there is no general definition available on the term façade or a façade system, it is used in a very general way in this document.
125	FSEU	Façade systems to be tested	General / whole document	As regards the position of the secondary opening: it should be at 1200 mm above the combustion chamber and not 1500 mm.		Ok. Since the position is not yet fixed we need to look at the source for 1.5m This is a relevant comment due to the common distance between windows. This will be

						further examined and discussed after the initial tests.
127	FSEU	Façade systems to be tested	Initial tests	The figure shows that the secondary opening is located 1500 above the top of the combustion chamber. A large part of the building stock in EU countries, traditional building that are being in use, have a typical spandrel height of 1.2-1.3 m. This difference can influence the behaviour of the façade around the window opening. Considering the existing building in EU and the increased focus on building renovation it is necessary that the proposed test method will also be applicable for existing buildings. Thus, the method shall adequately reflect the façade behaviour for the case when windows are installed with a typical spandrel height of 1.2-1.3 m. *Nb: Comment refers also to Paragraph 7.2.1 and Figure 9 in document "Assessment method - draft 1 dated May 7 2020 - SI 2 825082.pdf".*		Ok. Since the position is not yet fixed we need to look at the source for 1.5m This is a relevant comment due to the common distance between windows. This will be further examined and discussed after the initial tests.
129	FSEU	Façade systems to be tested	Figure 1. Eccentrically placed secondary opening	Secondary opening should be a representative distance for research/ baseline testing. In our view, this is not the case for the 1,5 m proposed.		Ok. Since the position is not yet fixed we need to look at the source for 1.5m This is a relevant comment due to the common distance between windows. This will be further examined and discussed after the initial tests.
131	FSEU	Façade systems to be tested	Figure 2. Example of test specimen for	Floor and ceiling should not be part of the tested specimen because the purpose of the		The question whether the floor to external wall junction shall be an optional part of the method has been sent to the Steering Group.

			study of the position of the secondary opening	test is not to test the whole construction.		
134	FSEU	Façade systems to be tested	Experimental round robin	Based on our experience it is very difficult to obtain tests reports/evidence showing a façade system that fails after 30 minutes into the test. For most of the façade test the temperature registered after 30 minutes decreases as the fire source is extinguished. The extinguishing of the wood crib in BS 8414 and DIN 4102-20 represent a major weakness of the tests since it does not allow an evaluation of the façade behaviour for a complete burnout of the wood crib. This shall be corrected in the new test method in order to permit a more comprehensive assessment of the fire behaviour of façade systems. FSEU recommends that the wood crib is not extinguished in the test method. In a real fire event, in very few cases fire service will arrive on site and manage to extinguish a fully developed fire in 30 minutes.		A complete burnout of the wood crib can give both advantages and disadvantages. We are now looking for a harmonized method with which products can be classified. Thus the method shall have a good repeatability and reproducibility. The problem with wood cribs is that the stability of the wood crib will be lost due to the charring of the wood, and the time and how the crib collapses is random. If a total burnout is used, the heat exposure from the wood crib will therefore be quite random, and the repeatability will be very low. Therefore the proposal will give a time for extinguishing the wood crib, in order to ensure that the heat exposure to the test specimen from the fuel is repeatable.
135	FSEU	Façade systems to be tested	Experimental Round Robin 3rd paragraph	The crib should be left to burn out especially if the smoldering assessment is 6hrs later		A complete burnout of the wood crib can give both advantages and disadvantages. We are now looking for a harmonized method with which products can be classified. Thus the method shall have a good repeatability and reproducibility. The problem with wood cribs

						is that the stability of the wood crib will be lost due to the charring of the wood, and the time and how the crib collapses is random. If a total burnout is used, the heat exposure from the wood crib will therefore be quite random, and the repeatability will be very low. Therefore the proposal will give a time for extinguishing the wood crib, in order to ensure that the heat exposure to the test specimen from the fuel is repeatable.

139	FSEU	Façade systems to be tested	Combustible rain screen and non-combustible insulation - Questions to stakeholders:	Agree with the proposed system.
				Following technical modification are recommended to obtain the desired result:
				• Test of 10 mm HPL boards.
				  ○ Thicker HPL boards ignite more difficult and have a slower fire growth. This boards are recommended for construction of a borderline system.
				• 10 mm installation joints
				  ○ Major HPL producers recommend minimum 10 mm joints for the installation of HPL boards.
				• Install the boards on using aluminium supports and fixings
				  ○ Aluminium metalwork is commonly used in rains screen facades
						Thanks for the proposal. When deciding on the systems to be used we will primarily rely on historical data obtained with some national tests showing that the system is on the border line of approval. Therefore we hope that some stakeholder can provide the necessary information.

				• Fire barriers to be installed in continuation of every floor slab Fire barriers are components of a rainscreen façade in order to ensure compartmentation at every floor slab. The barriers will influence both the external and internal temperature measurements.		
140	FSEU	Façade systems to be tested	Figure 4. Example on an ETICS with combustible insulation.	The render should be better defined in terms of the type (organic/inorganic) and thickness.		Thanks for the proposal. When deciding on the systems to be used we will primarily rely on historical data obtained with some national tests showing that the system is on the border line of approval. Therefore we hope that some stakeholder can provide the necessary information.
143	FSEU	Façade systems to be tested	Figure 5. Example of test specimen for round robin on ventilated wooden facade.	Floor and ceiling should not be part of the tested specimen because the purpose of the test is not to test the whole construction.		The question whether the floor to external wall junction shall be an optional part of the method has been sent to the Steering Group.
149	Kingspan	Façade systems to be tested	Presentation first webinar	Indoor versus outdoor testing In the webinar the details highlighted outdoor testing to be part of the project. Would it not be a better use of resources to focus on indoor first and get this repeatable before moving outdoors (maybe in a second phase during harmonisation?)		All initial tests will be performed indoors, so outdoor tests will only be made during the experimental round robin. Even if the tests are performed indoors it is important to control the environmental conditions since ventilation and other factors may influence on the test.
157	Kingspan	Façade systems to be tested	Combustible rain screen	Questions to stakeholders: Is the suggested test specimen a good alternative, or do you have any other suggestion? Are there any details in the		Thanks for the proposal. We will keep in touch.

				suggested test specimen that should be changed to give the desired result? As previously mentioned there is a good evidence base with ACM FR in the large fire exposure with borderline pass and borderline fail why not use this as a start point		
190		Theoretical RR	General	Maybe add that it also assesses dropdown of parts of the façade. The part about the medium fire exposure scenario does not make that much sense and it makes it seem useless, which maybe it is.		It is clearly defined in the Assessment Method that it covers both solid and liquid material, and that size, weight and combustibility are all assessed. The medium heat exposure is a part of the contract, and it is not to decide from the project whether it shall be included or not.
191		Theoretical RR	General	- Are BIPV façades and glazed curtain walls included in the scope?		The aim is that the assessment method shall have as broad applicability as possible. Therefore, BIVP shall be possible to assess with the method. The question regarding curtain walls has been sent to the steering group. Otherwise all parts making a façade shall be possible to test with the Assessment Method. The scope and especially if there are some types of facades that not is to be covered by the method, it needs to be defined clearly.
193		Theoretical RR	Assessment method	it isn't clear, essentially, what difference between "external cladding system", "external wall assembly", "facade" and "facade system"		The definition of façade has been rewritten as follows: *A complete external wall construction of any type (massive wall or curtain wall …etc.) or constitution (masonry, combustible material …etc.). Since there is no general definition available on the term façade or a façade system, it is used in a very general way in this document. Due to different uses of the term in the Member States, and the present*

						assessment method have to be applicable in all Member States the definition has to cover everything from the outer skin of the building envelope to the full external wall. What to test in accordance with this assessment method is than defined by the regulations and requirements in the individual Member States and the field of application.
194		Theoretical RR	Assessment method	There is a need to define window frame especially to clearly make a difference with structural frame		A definition on window frame has been added in the Assessment Method. *In the test it is possible to have a protection of edges around openings which would be the case in practice through details from windows. In order to standardise the test special window frames will be used in the tests performed in accordance with the present method. They will not be window frames as found on the market, but will be special well-defined parts to be used in the tests representing typical window frames.*
195		Theoretical RR	Assessment method	Maybe add under "Euroclass", that it has to be the "reaction to fire" for each individual material and not a composite material like for example an insulation with foil on that reduces its reaction to fire from eg. C to B or a steel plate in front of another burnable material that again helps it to get a better Reaction to fire class.		The definition of "combustible (layer) has been updated to the following: *Material whose Euroclass ranges from B to F or whose reaction to fire performance has not been determined. Materials have to be assessed individually, i.e. a composite material may have a Euroclass A due to a good protection of a backing combustible insulation, and in these cases each material must be assessed individually.*
197		Theoretical RR	Assessment method	definition of "finished corner" is identical with "inner corner"; definition of "Euroclass" mentions "… D, E, F, …" what lower classification as F is possible?		There is a difference between the two definitions, see also figures 17 and 18 in the Assessment Method. The extra dots after "F" has been removed.

198		Theoretical RR	Assessment method	Definition of hygroscopic material is missing		A definition will be included, and also examples on hygroscopic materials, as well as material that are regarded as an-hygroscopic.
199		Theoretical RR	Assessment method	Please give definitions or references to other standards - where they are defined - to all products and systems which are listed in the scope. (rain screen, ETICS, etc.) Additionally 'hygroscopic materials' shall be also defined.F		For systems where there are product standards, these will be listed. A definition of hygroscopic materials will be included, and also examples on hygroscopic materials, as well as material that are regarded as an-hygroscopic.
200		Theoretical RR	Assessment method	Definition of hygroscopic material is missing		A definition will be included, and also examples on hygroscopic materials, as well as material that are regarded as an-hygroscopic.
201		Theoretical RR	Assessment method	are sometimes unclear, ie structural frame, protecting the opening		The assessment method will be rewritten to some extent to clarify all points received. An example of a structural frame will be presented in an informative annex to the Assessment Method. The definition on protection of openings will be changed and made clearer.
202		Theoretical RR	Assessment method	Supporting construction: ... mounted on the structural frame (not test rig) onto which...		The definitions have been changed and are now correct: *A secondary structure mounted on the structural frame onto which a façade test specimen can be mounted. A supporting construction may be necessary when not the full external wall is tested.*
203		Theoretical RR	Assessment method – Test specimen	1) Is specimen (main face and wing) the equipment??? 2) In Figure 4 (first drawing) isn't marked depth of combustion chamber (1000 mm) like in Figure 3 (800 mm) 3) in Figure 4 and 6 (first		The test specimen consists of both a main face and a wing, which is mounted on the structural frame, or on a supporting construction. New definitions on "main face" and "wing" have been introduced:

				drawings) shown that base layer should consist of 15 short wood sticks, but in the description (4.6.3 7 line) written 10 long sticks (i.e. the sticks of the layer at the bottom are parallel to the rear wall of the combustion chamber, like in case of medium fire exposure). Drawing correction required.		*Main face - The large vertical surface of the test rig and test specimen in which the combustion chamber is placed.* *Wing - The smaller vertical part of the test rig and test specimen placed at a 90° angle to the main face*. 2) Will be corrected. One measure was missing, although on the right figure the depth is shown. It will however also be included in the left figure, so it is made in the same way as figure 3. 3) The figures will be corrected
204		Theoretical RR	Assessment method – Test specimen	In case of medium fire exposure, distance of combustion chamber opening from finished corner (50 mm) is very small. It could cause problem for the setup of the protection to opening of the combustion chamber.Chapter 4.4. note says : It is recommended to fix the supporting construction on the structural frame for safety reasons. This should not be a simple note, it shall be mandatory		This may be changed, so the chamber will go all the way to the corner, i.e. distance 0 mm
205		Theoretical RR	Assessment method – Test specimen	1. It would be a lot better to change the distance called D in figure 2b above to 250 mm for the medium scale fire so it is the same for the two sizes. It will make it a lot easier to make and change the combustion chamber for the two setups and the wing will not have to be able to move		This may be changed, so the chamber will go all the way to the corner, i.e. distance 0 mm

				an extra 200 mm for a medium fire test. 2. The distance from the top of the combustion chamber to the bottom of the secondary opening is 1.5m. In our experience, this is a bit too big. In existing buildings, this height is normally 1.2-1.3m, which is a "worst case" scenario. We would suggest changing the wording to "The secondary opening shall be 1200 mm width, 1200 mm height. It shall be located 1200 mm above the top of the combustion chamber and 1250 mm from the finished corner. See figure 9."		
206		Theoretical RR	Assessment method – Test specimen	4.4 Also it should be allowed to mount the facade system to an associated supporting construction, if the facade is intended for this mounting. In this case there should be different rules in DIAP. 4. 7.1 A detailed description of the design of the thermocouples (external and internal) would be useful.		Our view on this topic is that if an "associated supporting construction" is to be used, it will be a part of the test specimen. A more comprehensive description on the placement of thermocouples as well as some examples will be provided.
207		Theoretical RR	Assessment method – Test specimen	- Are horizontal steel elements of the rig positioned as they were on site floor slabs? Distance between floors could be part of the definition for the actual test specimen - Is a Light Steel Frame external wall ever considered as a supporting wall (i.e. LSF wall placed between floors) or		A figure explaining the dimensions of the test rig compared to a building will be added to the documentation.

				do you consider it always as part of test specimen? Fire scenario for walls mounted between floors, according to the relative distance between the crib and the exposed face of façade, seem to be less favourable		
208		Theoretical RR	Assessment method – Test specimen	4.7.4 the number of cameras during the test could be difficult to fulfil in our conditions, but we understand this recommendation 4.7.5 Is it necessary to use the load cell platform during the test? It is only information about the course of the test, but it is not used in the assessment. 4.7.6 We can't imagine much how to weigh it, it can be a subjective evaluation that the customer will try to have questions and it is a space for speculation.		4.7.4 as in many other tests measurements are made but not used in the assessment. For example, furnace temperature and pressure in furnaces are measured but not part of the assessment in fire resistance testing. These measurements are of the same category, i.e. they are done to show that the test was performed within some predefined tolerances. 4.7.5 that has to be decided after initial wood crib tests. 4.7.6 a task of the project is to develop a procedure to measure the falling parts during the test.
209		Theoretical RR	Assessment method – Test specimen	Test rig and the combustion chamber connection detail could be more in detail		An annex will be included in the Assessment Method showing an example of a test rig, and also how to join the combustion chamber to the test rig.
210		Theoretical RR	Assessment method – Test specimen	Explanation required on structural design of the frame. Details required on the specification of load cell, its placement and protection. Drawings of load cell platform has to be provided. Specification and arrangement of fan to be used in the medium fire exposure. Number of sticks for crib to be specified in medium exposure.		Agree. More detailed examples are needed. All these details have been pointed out in other comments and they will be handled. More clarifications and examples will be introduced in the Assessment Method.

				Explanation on method of mass measurement of falling parts using load cell is required and clear definition.		
211		Theoretical RR	Assessment method – Test specimen	I think that concrete blocks (not only aerated concrete) could be used for supporting construction. Detailed examples of steel frames may be incorporated.		The impact of the supporting construction needs to be evaluated. After that, a proposal on materials or material properties can be made.
212		Theoretical RR	Assessment method – Test specimen	1. inclusion of the load cell for the timber crib will add to the difficulty of the test. 2. An example or schematic drawing of testing rig would be beneficial; 3. The lower beam at 2.5m is coinciding with the chamber's roof. Therefore, this position needs to be modified. Also this will have a direct impact on tests where floor joints are going to be tested; 4. The method of measurements of the falling parts need further clarification because the current given method is not precise.		General: Agree that more examples and details are needed in the method. It is, however, too early in the project to give all details, since this is part of the study to be performed. 1: The measurement of the mass loss of the wood crib is used in the experiments carried out now in the project, and is one of several possible ways to characterize the heat exposure to the test specimen. We have to have some way to show that the heat exposure to the test specimen is similar from test to test, so we are now looking on different ways to do this. It is thus not decided that the mass loss measurement of the wood crib will be used in the final AM. 2: It will be included 3: We will include a proposal on a structural frame, which will work in practice! 4. We are still in the process to evaluate different methods for the measurements of falling parts. When we have decided on the most practical and economic method, it will be more clearly described.
213		Theoretical RR	Assessment method –	Supporting structure belong to test specimen or is it part of test stand?		The supporting construction is not a part of the test specimen, neither is the test frame.

			Test specimen	How should air flow of fan be determined? The setting of fan or measurement of air flow must be made uniform. How should cribs be stacked? Stacking according to DIN 4102-20, Fig. A.4? Density for spruce is ca 450 kg/m³, pine 350-500 kg/m³. How should 400 +- 25 kg/m³ be achieved? Define the base frame for the crib more precisely. Grating? Surrounding frame? Closed sheet metal? 3 mm TC is more practical		More details on the fan and measurement/control of the forced ventilation for the medium heat exposure test will be given. It is part of the initial tests. A calibration method, or measurement method will be investigated. The density of the wood to be used has not yet been set, it is part of the tests carried out in Task 2 of the project. The base frame for the crib will be defined. After the initial wood crib tests have been performed we will have more experience. There are pros and cons with the different sizes of thermocouples, and the final choice has not yet been done. This will also be part of the study. A proposal is to have a span, i.e. 1-3 mm, but to use the same size on all TC in the test. In the tests to be performed differend thermocouple diameters will be used, and we will also use research results from other studies where different sizes of thermocouples have been used.
214		Theoretical RR	Assessment method – Test specimen	: The load cell below the heat source is technically complex and expensive without creating important added value. Well defined timber crib specifications should be sufficient. Test rig shall continue 500 mm ± xx mm below the lower edge of the combustion chamber instead of at least 500 mm. Details concerning fan for medium source test.		It has not yet been decided whether measurement of the mass loss during the test shall be done. Although, this is one possible method to demonstrate that the heat exposure to the test specimen is within certain limits. Other techniques will be studied as well such as measurement with plate thermometers in front of the combustion chamber. Some way to demonstrate that the heat exposure to the test specimen is within certain limits will be needed. It may turn out that with the tolerances chosen for the wood crib it is enough to characterise and ensure the same heat exposure to the test specimen.

						The uplift of the test rig is part of the study and has not yet been done. More details on the forced ventilation for the medium heat exposure will be included.
215		Theoretical RR	Assessment method – Test specimen	The load cell below the heat source is technically complex and expensive without creating important added value. Remove load cell. Well defined timber crib specifications should be sufficient. Test rig shall continue 500 mm ± xx mm below the lower edge of the combustion chamber instead of at least 500 mm. Details concerning fan for medium source test.		It has not yet been decided whether measurement of the mass loss during the test shall be done. Although, this is one possible method to demonstrate that the heat exposure to the test specimen is within certain limits. Other techniques will be studied as well such as measurement with plate thermometers in front of the combustion chamber. Some way to demonstrate that the heat exposure to the test specimen is within certain limits will be needed. The uplift of the test rig is part of the study and has not yet been done. More details on the forced ventilation for the medium heat exposure will be included.
227		Theoretical RR	Assessment method – Test specimen	Questioning the practicability of the load cell		This is one possible way to show that the heat exposure to the test specimen is within certain limits. Other alternative techniques will also be studied before a decision on the final proposal is made.
228		Theoretical RR	Assessment method – Test specimen	For the Forced Ventilation at the back of the combustion chamber? And requirement about the exact location? It should be at the centre of the back of wall? Since it is forced ventilation, the location seems important		The exact location will be defined, as well a technique to show that the correct ventilation is kept during the test. The definition used DIN 4102-20 will be used.
229		Theoretical RR	Assessment method – Free comment	For the two methods the placement of the secondary opening changes, this will also make it a lot harder to construct the structural		The aim is to make the method as simple as possible, and as far as possible have the same geometry for the medium and large fire exposure tests. Studies are currently in progress. We are working on a design of the

				system. Would it be possible for the medium fire test to move the combustion chamber up to the top right corner of the large fire combustion chamber? This would make it a lot easier to build.		combustion chamber which will allow for testing with both the medium and large heat exposure, and thus the upper edge of the combustion chambers need to be at the same level.
230		Theoretical RR	Assessment method – Free comment	The distance from the bottom of the combustion chamber to the floor should according to the standard be minimum 500mm called G in figure 2a. We suggest also adding a maximum because we have experienced, when testing façade systems, that the height below the combustion chamber will affect the flow up the façade and apply of air to the fire a lot. The larger the distance to the floor the more powerful the fire will be.		Agree. Experimental studies will be carried out with different distance between the floor and the combustion chamber. After these studies have been made we will make a proposal on the distance needed to ensure that falling parts are not ignited due to the radiation from the combustion chamber, and also the tolerances on this uplift.
231		Theoretical RR	Assessment method – Free comment	Regarding the thickness of the supporting construction it is currently set to 200mm in thickness would it be possible the make this a range from minimum100mm or from 100 -250mm this will not affect the test results but it will help to have some more freedom in the design of the façade rig.		Agree. We will study the impact of the supporting construction on the test specimen, and after this give our proposal. The aim is to make the method as simple and cost efficient as possible, and this is an example where a wider choice of materials and dimensions can make it easier for the labs.
232		Theoretical RR	Assessment method – Free comment	The combustion chamber should according to the standard be constructed by aerated concrete. In our experience this aerated concrete will not last for that many fire test before it will		We will look on alternative solutions on the combustion chamber. The aim is to have a method that is cost effective, and as you point out frequent renovations drive cost. A ceramic blanket will be used during the initial wood crib tests to protect the walls of

				have to be changed. Would it be possible to allow for eg. A 50 mm Ceramic wool to be mounted inside the combustion chamber to reduce the fire load on the aerated concrete. Of course the fire chamber would need to be a bit bigger to insure the inside dimension a kept after the wool is added.		the combustion chamber. More data will be available after initial wood crib tests.
233		Theoretical RR	Assessment method – Free comment	The density of the wood should be 400 kg/m³ +-25 kg/m³. Is this the average density of the total wood crib or how should this be understood. We also think that it will be very hard to buy wood with a specific density, because wood is not sold like that it is sold by type/species and dimensions or by strength class like C18. It will be very time consuming work to prepare for a test and make it very expensive if a standard product is not used.		This is a problem when using wood as a fire source. We will look on the impact of different characteristics of the wood on the heat exposure to the facade. There are different ways to define the fire source. The total weight and number of sticks (that is the mean density of all sticks), the total weight only (the number of stick will depend on the average density), the number of sticks and the density (or weight) of each stick This is now studied in Task 2 of the project, and the aim is to find the most cost effective solution at the same time as we can ensure a good repeatability.
234		Theoretical RR	Assessment method – Free comment	It is very unfortunately that the square sections of the wood sticks varies in the medium and large fire. This makes the upkeep for the tests a lot harder to control and to have room for. We would suggest that only one dimension of the square sections is used preferably the 50x50mm one. Also the 50x50 is not a standard wood size in our country we use 45x45mm or sometimes 50x47mm.		We are now working with the dimensions 47x47 mm after planning, which is a dimension that is probably the size that is possible to find in most member states. Another possible alternative is sticks with cross section 45x45 mm. The aim is to have the same dimensions and wood characteristics for both the medium and large heat exposure tests.

235		Theoretical RR	Assessment method – Free comment	The conditioning of the wood should be made easier. The demand of 23°C at RH50% is to strict and will require a very large special room for this with an automatic control. We suggest that the demand should have some more variations like temperature between 10-30°C and RH between 40-60%.		This is part of the study now carried out where we will look on the effect of different parameters of the fuel on the heat exposure to the test specimen. One of these parameters is the moisture content of the timber. If it is shown that it does not have an impact, then the tolerances on the conditioning can be wider. We have to await the results from the study before any new proposals can be made.
236		Theoretical RR	Assessment method – Free comment	The measurements of the mass loss of wood cribs introduces a new challenge. To be able to measure the weight of the crib down to 1% of the total load the floor the wood crib platform stands on will need to have air gaps all around the four sides so there is no friction against the walls. This will introduce an airflow from the area below the combustion chamber to the combustion chamber itself. This flow will increase, as the chimney effect grows larger during the test especially for the large fire exposure where there is no opening for fresh air to enter from. It is our believe that this air gap could change the results of the test depending on how big it is. A solution could be to remove the mass loss measurement or to specify the allowed gap size eg. 5-10mm.		The weight loss measurement is one of the methods examined at present to be used as a technique to demonstrate that the heat exposure to the test specimen is within certain limits. It has thus not yet been decided whether it will be used or not. If it will be used, more definitions and details will be given. It is true that some gaps will be needed. Although, it is also possible to reduce the eventual air flow from the small chamber with the load cell by making that chamber air tight.
237		Theoretical RR	Assessment method –	on page 18 - …test hall shall be large enough…, maybe it's		To be checked and more details will be introduced if necessary.

			Environmental conditions	possible to set any minimal distance?		
238		Theoretical RR	Assessment method – Environmental conditions	It should not be necessary to measure the air velocity for an inside test for 15 minutes before each test. Only when changing the test rig should it be verified that the air flow is below 3 ms-1. An airflow of 3m/s seems like a lot for an inside test even though the ventilation is running on full speed. We would prefer if the demand was lowered to maximum 1 ms-1 to insure similarly results at all labs. Ambient should just be measured during the test at a place not affected by the radiation. It should just follow the same rules as in EN 1363-1, no need to invent something new here.		The air flow or wind speed around the test specimen has not yet been decided, it is part of the study to be conducted. Depending on the results from this study more details will be given on eventual measurements to be done.
239		Theoretical RR	Assessment method – Environmental conditions	- Is it necessary to measure humidity or pressure conditions before the test? Or are those measurements in the "Ambient conditions" file for the exercise for information only? - Which is the reference line for the measurement angle for air velocity? Orthogonal or parallel direction regarding the main wall?		It is not decided yet whether any measurements and declaration of the ambient conditions will be needed. If so, a good description on what, where and when to do the measurements, as well as details regarding the instruments needed, will be provided.
240		Theoretical RR	Assessment method – Environmental conditions	5.4 The dimensions of the hall must be such that there is no back radiation - how to judge it? It is quite complicated.		Some CFD calculations will be made to estimate eventual effect of back radiation from walls and roof. These will give the basis on the proposed dimensions of the hall as well as distances to walls and roof 8and eventual smoke extraction ducts).

241		Theoretical RR	Assessment method – Environmental conditions	Ambient temperature range for the commencement of test, installation, and curing has to be extended considering countries with extreme climatic conditions.		The aim is to extend as far as possible, but also to ensure that repeatability and reproducibility still is good enough.
242		Theoretical RR	Assessment method – Environmental conditions	5.1 Measurement over 15 min necessary? Is 1 min not enough? 5.1 How should anemometers be aligned? Vertical to the main face to the wing or to the floor? 5.4 Size of the test chamber is very spongy - specify more precisely.		This is part of the study to be made. At present the aim is to enable the tests to be carried out outdoors, and thus to long time to do the measurement has been judged to a minimum. Although, this may be changed when more information is available.
243		Theoretical RR	Assessment method – Environmental conditions	Indoor testing: ventilation is allowed, not obligatory? Too less ventilation may cause a reduction in burning velocity of the crib as not enough O2 present.		It is generally not a problem. The hall in which the tests shall be performed shall be safe for personnel, and a certain ventilation is therefore always needed.
244		Theoretical RR	Assessment method – Environmental conditions	Indoor testing: ventilation is allowed, not obligatory? Too less ventilation may cause a reduction in burning velocity of the crib as not enough O2 present.		It is generally not a problem. The hall in which the tests shall be performed shall be safe for personnel, and a certain ventilation is therefore always needed.
245		Theoretical RR	Assessment method – Environmental conditions	maybe given ranges could be more praticable, ie for wind spead		This will be studied in Task 2, and eventual range or tolerances will be established.
246		Theoretical RR	Assessment method – Environmental conditions	Why is the vertical component of the air speed not measured? That seems to be the parameter of more interest especially when using an extraction system (indoor testing)		The question will be brough to the Task 2 working group. We will in the tests characterise and measure wind speed and its direction (in 3D as far as possible). These measurements have to be performed some distance from the test setup.

247		Theoretical RR	Assessment method – Environmental conditions free comment	Outdoor testing should not be allowed it makes no sense to allow this: It states that the ambient air velocity is measure before the test. For outdoor test both velocity and wind direction can change/gush during testing. This will influence the results of the fire test. And should at least be measured during the test to have any possibility of being valid. The factor of rain/snow is not taking into account, if it has rained before the fire test or two days before the fire test. How do you insure that the test specimen is dry and in equilibrium before the test. For ETICS façade where most of them will need 28 days of curing before a fire test how do you ensure that the façade is dry and in equilibrium before a test, there should at least be some rules about this in the standard. A final point to not allow outdoor testing is the environmental part. The façade can consist of many different things and to allow the test to be performed outside will result in unnecessary pollution of the environments and the planet we all have to live on, and this cannot be the wish for an EU standard.		The question is not whether the test is done "indoor" or "outdoor", since that is a very imprecise definition. A lab can have smoke ventilators on the roof which are open during the test (it could thus rain on the test specimen), you can be outdoors and have a roof above the test site. There are many different alternatives. Also, indoors you may have "strong" winds due to the ventilation system. Therefore, we will look on the requirements on the environmental conditions, and it is then up to the lab to find out the best solution at their premises. Our present proposal on storage and conditioning of the test specimen is that it shall be done where you have protection from rain and snow, and that the temperature is within certain limits. There is also a method to determine moisture of hygroscopic materials in Chapter 8 using a mock-up test. Furthermore, facades are usually used outdoors and thus exposed to the outdoor conditions, and therefore the moisture content can vary in a large span in the façade materials. Also the requirements regarding distance to walls and roof will be studied through CFD calculations in the project.

				It mentions that the distance from walls to the test specimen has to be large enough; it would be a lot better with an minimum distance. Also the flow and oxygen percentage is affect a lot by the size of the test hall and the change air. We suggest that there should be a minimum of 2 m to each side of the test rig and 5 m in front of the test rig. It could also be an idea to measure the oxygen level inside the test hall during a calibration to insure that there is an large enough change of air during a test.		
248		Theoretical RR	Assessment method – Test specimen	Maybe you would be better to just refer to EN 1363-1 like the other standards and only add the parts that is not mentioned there: "The test specimen shall be constructed as described in EN 1363-1" "Verification of the test specimen shall be carried out as described in EN 1363-1"		This may not be possible because we are dealing with quite different products. Fire resistance testing is mainly for products used indoors, and thus under a "controlled" climate, while facades are always outdoors, and exposed to a very different climate. We are looking for parts where we can refer to other standards, as far as possible.
249		Theoretical RR	Assessment method – Test specimen	- Fire barriers may have a relevant influence in the outcome of the test and there is no provision for them in the definition of the specimen - Vertical edges shall be sealed to prevent any ventilation. Which type of seal shall be used? A1 material? - If LSF is assembled on site between floors, would it be		How to design the vertical edges will be prescribed, and also what kind of characteristics of the material to be used. It may also be that the upper horizontal edge will be prescribed in the same way, but this is not yet decided since it may have an effect of the fire spread in the façade system if it is ventilated. The test specimen and what to be tested will always be a discussion between the client and

				considered as supporting wall or as tested façade? The positioning of the crib if LSF were considered supporting wall or tested façade could have a relevant influence in the final test results		the la and it will always have an effect on the field of application. If, for example, fire barriers are used then they must also be used in practice. If they not are used in the test, it would most certainly be possible to add them in practise. It is important to remember that the building regulations are different in each member state, and thus a system that may be accepted in one country, will not be acceted in another due to different requirements.
252		Theoretical RR	Assessment method – Test specimen	1. A fixed height of a test rig will allow more harmonized test method. Therefore, it is recommended that the test rigs to have a fixed height with some tolerances. Also, adding a round of thermocouples 200mm to 300 below the top of the rig with allow for more harmonized testing procedure. 2. Info about structural frame and wall is not very clear: what about eg. concrete buildings; the steel supporting construction needs to cover all types of buildings.		The height of the test rig will be fixed after the studies have been performed. We cannot see why additional thermocouples 200-300 mm below the top of the rig should make the method more harmonized. The structural frame can be made of any material, its only function is to be a stable frame on which the supporting construction can be mounted (or the full external wall). Thus it can be designed in many different ways, depending on other functions, i.e. platforms behind the rig for labour and other.
253		Theoretical RR	Assessment method – Test specimen	6.1 Main face width -> 3200mm necessary for medium? According to experience 2000mm are sufficient 6.3 Vertical joint for large and medium always centered above fire chamber		The aim is to have a rig that can be used for both the medium and large fire exposure, therefore the same width and height. The position of vertical joints is mainly a question for the field of application, which is outside the scope of the present project.
259		Theoretical RR	Assessment method – Mounting of	If the façade overlap the combustion chamber as on Figure 10 where is the size of		Examples on how to do the design of test specimens will be included.

			the Test specimen	the combustion chamber measured at, the height on 1000/2000mm? At the roof of the combustion chamber or at the bottom of the overlapping façade? The same goes for the sides The backing board should not be a water releasing material like gypsum, but more like a CaSi board.		Specification on the backing board will be included.
263		Theoretical RR	Assessment method – Mounting of the Test specimen	7.2.1 secondary opening is not within reach of the flames (normally) would have to be moved closer to the fire chamber (see large-config.)		The position of the secondary opening is part of the experimental study to be carried out.
266		Theoretical RR	Assessment method – Mounting of the Test specimen	unclear, floor to facade junction, which structures protect the facade opening, which opening, the one framing the window or the opening to the facade ie where flames could enter into the facade struture. The diagrams in the annex C are hard to understand. More clear detailed drawings are needed.		The question on floor-façade junction has been sent to the Steering Committee. If this assessment shall be covered by the method a more precise description will be made.
269		Theoretical RR	Assessment method – Conditioning of the Test specimen	It will be much better and more future proof if you just do as in all the other fire standards and refer to EN 1363-1. We suggest that the complete chapter 8 is change to: The test construction shall be conditioned in accordance with EN 1363-1.		The aim is to refer to other standards as far as possible. There is however a difference between facades and most other materials/structures covered by fire resistance and reaction to fire tests and that is that facades are always outdoors while other products are used indoors, i.e. the environmental conditions are very different.
270		Theoretical RR	Assessment method – Conditioning	- Maximum curing of 28 days for i.e. ETICS systems? - Which criteria would be used		The curing time is not limited to 28 days, it can be longer. Although, this makes it possible to perform the test after 28 days (if

			of the Test specimen	to determine if a material is hygroscopic (i.e. water absortion)? - If only a component of the whole system were hygroscopic, the mock up should be made up of all the components of the façade or just with the hygroscopic one? (i.e. in stone cladding rainscreen façades, the weight variation related to the the insulation moisture content could be insignificant compared to the total weight of the mock up)		nothing else is agreed on between the client and the lab). A definition on "hygroscopic material" shall be made. Examples on typical hygroscopic and non-hygroscopic materials will be given.
271		Theoretical RR	Assessment method – Conditioning of the Test specimen	8.2 taking individual parts from the mock-up specimen and drying should be described more precisely, when to assemble it, it is not certain what exactly the hygroscopic material is (we understand that it is not e.g. mineral wool for these cases)		A definition on "hygroscopic material" shall be made. Examples on typical hygroscopic and non-hygroscopic materials will be given.
272		Theoretical RR	Assessment method – Conditioning of the Test specimen	More details on the requirement of mock up for conditioning. Hygroscopic nature of the material has to quantified to avoid variation. A list of standard hygroscopic materials can also be included in the standard. Presence of supporting construction for masonry application in the mock up has to be mentioned. Accuracy of measurements in weight of the mock up shall be provided or else if it is		A definition on "hygroscopic material" shall be made. Examples on typical hygroscopic and non-hygroscopic materials will be given.

				referring back to BS EN 13238 that has to be specified.		
273		Theoretical RR	Assessment method – Conditioning of the Test specimen	Consideration to limit the maximum curing period of 28days. Or alternatively, preconditioning of the materials to be allowed.		The curing time is not limited to 28 days, it can be longer. Although, this makes it possible to perform the test after 28 days (if nothing else is agreed on between the client and the lab). Preconditioning is possible, and is not forbidden. But it is not always possible, and the moisture content of hygroscopic materials shall be determined with the mock-up test.
274		Theoretical RR	Assessment method – Instrumentation	Internal and external thermocouples should be positioned on same specific locations. In case, you have a lot of layers (more then 4) you have to face the situation to install external thermocouples within 10 mm on each locations with a lot of internal thermocouples in the same area. In addition, knowing that you install thermocouples by drilling from the backside of the façade system, it will be difficult to maintain the distance tolerance of 10 mm for external thermocouples.		There are some practical issues on the application of the thermocouples. After the experimental studies we will have more experience and will give a better explanation on how and where to place the thermocouples. We will also use the experience from labs that are performing these types of tests today.
275		Theoretical RR	Assessment method – Instrumentation	The suggested solution for mounting thermocouples in the façade is very hard and not possible for many façade systems. Especially for the unexposed thermocouples. You have to drill a 2 mm hole "The diameter of the holes shall be the minimum required to allow the thermocouples to		Agree. There are some practical issues on the application of the thermocouples. After the experimental studies we will have more experience and will give a better explanation on how and where to place the thermocouples. We will also use the experience from labs that are performing these types of tests today.

				be inserted from the rear to the exposed face of the tested façade". It has to go through 200 mm aerated concrete then trough the test specimen and out the exposed side through the a façade board in the example here for test 1 an ceramic tile. This is not possible.		
276		Theoretical RR	Assessment method – Instrumentation	- Which direction (angle) is considered for the measurement of ambient air velocity? - In Figure 11 it should be clarified that internal thermocouples located at mid depth of the external cladding and insulation layers are needed only when they are defined as combustible according to chapter 3 - It should be clarified the position of the façade-floor junction thermocouples in an additional vertical section to define the height at which they are installed (mid depth? unexposed side?)		Agree. More clarifications are needed. This will be made when more information is available after the experimental test program.
279		Theoretical RR	Assessment method – Instrumentation	It seems to me that too many thermocouples are employed. Thermocouples for smouldering criterion may be incorporated without referring to DIN standard.		Noted and will be considered. Smouldering has only been touched on in the present method. The question whether smouldering shall be part of the method will be sent to the Steering Group. The aim is to minimize the number of thermocouples.
280		Theoretical RR	Assessment method –	some of the thermocouples on column 1 and 2 are located at close proximity of the		The position of thermocouples have not yet been decided. This will be done when all

			Instrumentation	chamber (located about 500mm apart). Thus, when the temperature of the chamber is about 1000oC, temperature at those positions will be over 500oC regardless of the cladding. Hence, it is suggested to not to take the first two rows of thermocouples on those columns into account.		experiments have been carried out, and all information is available. In the initial tests the location of column 1 will be located 1000 mm from the edge of the combustion chamber. After the initial wood crib tests we will have more data to establish the locations to be used in the coming tests.
281		Theoretical RR	Assessment method – Instrumentation	Ext. TCs through entire test specimen -> destroy test specimen + prevent falling parts from falling down; place ext. TCs in front of test specimen Move C1&C2 closer to fire chamber with medium fire expo. fixed TC arrangement - see EDIN4102-24 - is better. Paragraph 3 -> formulate more precisely. Insert explaination of area "A" for PTs. Specify TE pos. as test stand differs from DIN4102-20		How to do the mounting of thermocouples will be described. The positions of thermocouples will be decided when all data from the experimental studies have been done. Definition of side "A" of the plate thermometers will be added. The position of thermocouples have not yet been decided. This will be done when all experiments have been carried out, and all information is available. In the initial tests the location of column 1 will be located 1000 mm from the edge of the combustion chamber. After the initial wood crib tests we will have more data to establish the locations to be used in the coming tests.
282		Theoretical RR	Assessment method – Instrumentation	Some thermocouples are located close to the chamber. Can they cause a failure due to the heat of the burning crib? 9.4 Checking of smouldering (optional) - "When the smouldering criterion is required, additional thermocouples in accordance with DIN 410220 shall be installed within the facade system." -> information in the		The position of thermocouples have not yet been decided. This will be done when all experiments have been carried out, and all information is available. In the initial tests the location of column 1 will be located 1000 mm from the edge of the combustion chamber. After the initial wood crib tests we will have more data to establish the locations to be used in the coming tests.

				standard itself instead of reference to a national standard.		
283		Theoretical RR	Assessment method – Instrumentation	Some thermocouples are located close to the chamber. Can they cause a failure due to the heat of the burning crib? 9.4 Checking of smouldering (optional) - "When the smouldering criterion is required, additional thermocouples in accordance with DIN 410220 shall be installed within the facade system." -> information in the standard itself instead of reference to a national standard.		The position of thermocouples have not yet been decided. This will be done when all experiments have been carried out, and all information is available. Smouldering has only been touched on in the present method. The question whether smouldering shall be part of the method will be sent to the Steering Group.
284		Theoretical RR	Assessment method – Instrumentation	To drill trough a ceramic tile is hard enough it is self and to do it through a 200mm + a test specimen is impossible/ or very, very, very hard. Then you need to do it 32 times without damaging the test specimen. We have looked at it and we cannot even find any drill or person that can do this. If this is kept in the standard it will make the standard useless and if you succeed in drilling the holes the test specimen will properly be very damaged and not representative of the real thing. We see this as the biggest problem/error in the standard and it need to be changes for the standard to work. We suggest that a wire		Information on how to mount thermocouples will be included. It is not yet decided on how the thermocouples in front of the test specimen shall be mounted. There will be more information after the experimental studies have been carried out. Experience and procedure used at labs doing this type of test at present will be included in the method.

				system is used on the exposed side where the thermocouples is mounted on. A wire is placed 50 mm from the test specimen at eg. Column 1. The tension is kept in the wire under the test by adding a dead load on the other end of the wire that will keep the wire in tension even though it expands by the heat. The thermocouples can now be attached to the wire and will measure the temperature at the same location without having to drill it through. The same can be done for column 2. For level 1 it can be done by adding a hook in the corner at the wing 5 mm out from both sides and the again use a wire placed horizontal. Then only one hole will have to be made in the test specimen to attach the hook to the supporting construction. The internal thermocouples will also be hard to install but this could be possible with you will need a minimum Ø10 mm drill to go +400 mm into a façade from behind. In column 2 in the wing we would just drill in from the side and 50 mm in this would be a lot easier than from behind. In section 9.4 DIN 4102-20 should not be mentioned.		

				Either it is a demand/optional in the standard and the description should be here or it should be removed. An European standard should never refer to a non EU standard, EU has no control over. We think that a smoldering criterion makes sense and should be in full in the standard, and preferably in a better way than in DIN 4102-20.		
286		Theoretical RR	Assessment method – Test procedure	Extinguishing timber crib doesn't allow to observe the influence of a higher calorific load when an additional combustible mass is present during the test (example : timbers joints, CLT, ….). However, this can influence the test and the fire behavior of the façade.		A complete burnout of the wood crib can give both advantages and disadvantages. We are now looking for a harmonized method with which products can be classified. Thus, the method shall have a good repeatability and reproducibility. The problem with wood cribs is that the stability of the wood crib will be lost due to the charring of the wood, and the time and how the crib collapses is random. If a total burnout is used, the heat exposure from the wood crib will therefore be quite random, and the repeatability will be very low. Therefore, the proposal will give a time for extinguishing the wood crib, in order to ensure that the heat exposure to the test specimen from the fuel is repeatable.
288		Theoretical RR	Assessment method – Test procedure	Why do there have to be two methods for igniting the wood crib for the large and medium scale, please remove one to make it more simple and logical. The extinguishing of the fire source with water will be hard to do and not affect the façade with steam/moisture that will go up the façade. Would it not be a better idea to just close the		The aim is to have the same timber characteristics and ignition method for both methods. It will be studied in the experiments carried out.

				combustion chamber with a small board or wall that is put as a front of the chamber. This could be done without having to go in front of the façade by mechanically closing the front or having the wall/board on wheels and pulling it closed with wires.		
290		Theoretical RR	Assessment method – Test procedure	- Invalidation of tests due to wind loading conditions considered? Shouldn't it be an extra criteria to stop the test? Direction and velocity of the wind has a clear influence on the test. A prodecure and assessment criteria could be determined for air measurements to be made in the surroundings of the rig (i.e. 3-4 m away from the crib) during the whole test, invalidating the test if a certain value (i.e. 9 m/s during 30s) is exceded		The effect of wind will be examined in Task 2 of the project. Before and decisions can be made we have to wait for the results from the experimental study.
292		Theoretical RR	Assessment method – Test procedure	Invalidation due to heat exposure: the heat exposure should be OK, if the heat source (timber crib) is within the prescriptions of the standard.		We have to wait for the results from the experimental study before and decisions can be made. Compromises have to be done, and if we have very restricted requirements on the wood for the crib, i.e. very narrow band of density, it will be costly and time consuming to find the correct fuel. If a wider band of density is allowed, it may have an effect on the heat exposure, and then a requirement on the heat exposure may be necessary.
293		Theoretical RR	Assessment method –	Invalidation due to heat exposure: the heat exposure should be OK, if the heat		We have to wait for the results from the experimental study before and decisions can be made. Compromises have to be done, and

			Test procedure	source (timber crib) is within the prescriptions of the standard.		if we have very restricted requirements on the wood for the crib, i.e. very narrow band of density, it will be costly and time consuming to find the correct fuel. If a wider band of density is allowed, it may have an effect on the heat exposure, and then a requirement on the heat exposure may be necessary.
294		Theoretical RR	Assessment method – Test procedure	Think about pulling away the crib instead of trying to extinguish it.		Noted. With an uplift of the test rig this will be impossible.
295		Theoretical RR	Assessment method – Test procedure	10.8: All test preformed outside should be invalidated it makes no sense to allow this. It seams a but harsh to invalidate a test if two thermocouples fails in a non-critical area if no temperature is close to 500°C and if the façade shows no sign of damage.		The question is not whether the test is done "indoor" or "outdoor", since that is a very imprecise definition. A lab can have smoke ventilators on the roof which are open during the test (it could thus rain on the test specimen), you can be outdoors and have a roof above the test site. There are many different alternatives. Also, indoors you may have "strong" winds due to the ventilation system. Therefore, we will look on the requirements on the environmental conditions, and it is then up to the lab to find out the best solution at their premises. A rule is necessary on the number of working thermocouples during the test. To ensure that the test is repeatable and reproducible it is not good to rely on judgement by the lab whether is a non-critical area or not.
296		Theoretical RR	Assessment method – Test criteria	We think it would be a good idea to also have a criterion for the total mass of fallen material eg. If the total mass from fallings parts reach 10 kg it fails. If a client just makes a façade of 0.9 kg heavy tiles they can all fall down and it can pass but it would still be		This question has been sent to the Steering Group.

				more dangerous than one piece of 1.1 kg falling down.		
297		Theoretical RR	Assessment method – Test criteria	shouldn't radiation be also performance criterion? (it is not much described in the method yet, but it will be probably added after the tests as written in Annex B)		A criteria on radiation is not present in the DIN and BS methods, and has thus not been incorporated in the new method. Although, radiation will be measured in the experimental studies to be carried out, and we have to wait for the results before any new proposals will be made.
298		Theoretical RR	Assessment method – Test criteria	Calculation of the weight of falling particles and its area is unclear, need to be explained further.		The details on falling parts will be clarified further. We also have to examine the different possible ways to measure falling parts before we can propose the final method.
300		Theoretical RR	Assessment method – Test criteria	procedure for burning/falling parts isnt practical. Molten parts cant be weighed, number of drops of burning/molten EPS cant be counted with reasonable effort When weighting falling&burning part s ? (burning wood is gone at end of test) Evaluation of molten parts (e.g. plaster+EPS melt)? use temp. eval. analogous to EN16733. TCs show >50C directly after exting. fire, so test have failed. Time should be changed to 6h after ignition or to 5h after exting. fire, otherwise test would be impractical		The methods to determine different types of falling parts will be further studied within the project. The time of the test is not yet decided and within the project we will make proposals based on the comments received by regulators, authorities, industries and fire laboratories. Regarding smouldering the question will be sent to the Steering Group.
320		Theoretical RR	Assessment method – Classification	Which classification is obtained if the façade-to-floor junction succeed? EI 30 or EI 60? There is only 30 minutes fire exposure. What if the façade-to-floor junction test		There is no classification included for the floor junction, it is only included as an optional way to perform a tests of this junction.

				fails on integrity? Is further testing for fire spread classification possible? The criteria for falling parts are very severe.		
321		Theoretical RR	Assessment method – Classification	Which classification is obtained if the façade-to-floor junction succeed? EI 30 or EI 60? There is only 30 minutes fire exposure. What if the façade-to-floor junction test fails on integrity? Is further testing for fire spread classification possible? The criteria for falling parts are very severe.		There is no classification included for the floor junction, it is only included as an optional way to perform a tests of this junction.
324		Theoretical RR	Assessment method – Falling parts	This section mentions that in case of other kind of falling parts (3D falling parts) an expert evaluation is necessary. It is not clearly defined by the test methodology how the falling parts are to be measured and evaluated. An expert evaluation cannot be part of the test protocol and therefore any reference to expert evaluations shall excluded from the tested methodology.		In the experimental study to be carried out different techniques to measure and evaluate different falling parts are included. We have to wait for the results before and decisions can be made.
325		Theoretical RR	Assessment method – Falling parts	More clarity required. Will be easier if it shows a sample calculation.		In the experimental study to be carried out different techniques to measure and evaluate different falling parts are included. We have to wait for the results before and decisions can be made.
326		Theoretical RR	Assessment method – Falling parts	This method may be imprecise. It also implies that area of a falling part is dangerous and not area of a falling part linked to a mass. Would a falling piece of 100		In the experimental study to be carried out different techniques to measure and evaluate different falling parts are included. We have to wait for the results before and decisions can be made.

				mm × 1000 mm tape be dangerous?		The criteria on falling parts is based on the current regulations in the Member States, and in some requirements on size are used.
327		Theoretical RR	Assessment method – Falling parts	The procedure is not practicable. How should plaster and molten EPS be separated in ETICS? What should be the procedure at ventilated façade systems with molten aluminium substructure and facade panels?		In the experimental study to be carried out different techniques to measure and evaluate different falling parts are included. We have to wait for the results before and decisions can be made.
328		Theoretical RR	Assessment method – Falling parts	Too complicated and not practible		In the experimental study to be carried out different techniques to measure and evaluate different falling parts are included. We have to wait for the results before and decisions can be made.
329		Theoretical RR	Assessment method – Calibration of heat exposure	A good idea to insure more consistent in the test results. But it will also make testing more expensive for the client, so it has to be done only if it makes sense.		How, when and what to be calibrated will be defined when we have all results from the studies to be carried out.
330		Theoretical RR	Assessment method – Calibration of heat exposure	- Which is the idea for such calibration? Monthly, yearly?		How, when and what to be calibrated will be defined when we have all results from the studies to be carried out.
331		Theoretical RR	Assessment method – Calibration of heat exposure	It needs further clarification in the document.		How, when and what to be calibrated will be defined when we have all results from the studies to be carried out.
332		Theoretical RR	Assessment method – Secondary opening	We are not convinced that testing without the window frame is worst case for all cases. If the frame is burnable, it could increase the fire load at the window and continue after the combustion		Noted and will be considered.

				chamber is put out. And if it eg. is made of steel it could damage the construction during expansion and create a crack or opening in the protection system. However, we agree that test without a window frame would make it a lot easier and allow for different types of window frames to be used afterwards.		
333		Theoretical RR	Assessment method – Secondary opening	Need to include more detailed explanation.		Noted and will be considered.
334		Theoretical RR	Assessment method – Secondary opening	It is not easy to understand.		Noted and will be considered.
335		Theoretical RR	Assessment method – Secondary opening	The provide description can potentially lead to different interpretation compare to the system which is on site. As such this Annex while it is informative, it would need further clarification.		Noted and will be considered.
336		Theoretical RR	Assessment method – Secondary opening	Too complex.		Noted and will be considered.
338		Theoretical RR	Assessment method – Façade to floor junction	When floor joint is tested, what sort of classification should be assigned to the tested joint? Also, if the floor joint fail, how would that affect the overall test?		The question whether the floor to façade junction shall be included in the method has been sent to the Steering Group.
339		Theoretical RR	Assessment method –	Too complex.		Noted and will be considered.

			Façade to floor junction			The question whether the floor to façade junction shall be included in the method has been sent to the Steering Group.