

**Report of the 6<sup>th</sup> meeting of the informal group on  
“Behaviour of M2 & M3 general construction in case of Fire  
Event (BMFE)”**

(<https://wiki.unece.org/display/trans/GRSG-BMFE-06>)

Date:           **Start     February 27**  
                      **End      February 28**

Venue:           **Norwegian Public Administration (Statens vegvesen)**  
                      **Brynsengfaret 6, Oslo**

1. Welcome and Roll call
2. Adoption of the agenda (BMFE-06-01e)

The Chair recalled that the target of the meeting is to table an informal document in GRSG-118 of April 2020, with an official proposal for the 119<sup>th</sup> session of GRSG in October 2020. The chair will communicate on this clarification at GRSG-116 in April 2019. The terms of reference of the group should then be amended in their paragraph 4, to read “4. The completion target and date for the work of the IWG shall be a draft amendment to UN Regulations Nos. 107 and 118 at the ~~120<sup>th</sup>~~ **119<sup>th</sup>** session of GRSG (October 2020).”

The agenda was adopted with the addition of the new documents.

3. Validation of the minutes of the last meeting (BMFE-05-20)

VDL informed about their concern regarding document BMFE-05-12 (D) on Smoke Gas Toxicity since it is published on the publicly open UNECE web site. The main reason is that sheet 13 of the document contains inaccuracies, because although the vehicle was indeed not equipped with AEBS, it did comply with the requirements then applicable. The spelling in that slide erroneously suggests that the vehicle was not complying with the type approval regulations. The Secretary informed having posted a re-edited document (BMFE-05-12-Rev.1) on the website, with a more accurate a statement.

D pointed out that should that vehicle have been equipped with AEBS, the impact speed would have been lower, and the severity of the accident would have most probably been lower.

The chair stressed that this system is not in the mandate of the GRSG-BMFE

Conclusion: the minutes were adopted with no change.

#### 4. Accidentology & statistics : inputs from experts

The group is expected to be informed of new inputs available coming from experts.

Focus on transversal factors [Chair]

- BMFE-06-05 (UTAC)
- BMFE-06-09 (RISE) Accident data

##### 4.1. Accidentology transversal factors (BMFE-06-05):

OICA had the concern that the table could be read as if the design of the vehicle would lead to spontaneous ignition.

S proposed to discriminate by “caused by impact” vs. “others”

The last slide providing the outstanding conclusions, was revised by the group. This revealed that the existence of an impact is a key criterion for discriminating the fire events and their severity.

The group agreed on the importance of a proper maintenance level and good PTI practices in the root cause of the fire events.

Conclusion on BMFE-06-05:

- Chair to improve the table to indicate the existence of data on NR date, and collision related. “0” in the “victim” column. Formatting to be improved as well (Excell vs. Word vs. PPT)
- All believe this table a relevant informal
- Table to be a living document, where all parties can share their data.
- RUS to undertake finding RUS data.
- Revision 1 of the document to be posted on the website.
- All experts are requested to provide input.

##### 4.2. Recollection of fire events (BMFE-06-09)

RISE presented the slides 10, 14, 16, 20 and 27 from 06-09, showing the evolution of fire events in Sweden between 2005 and 2013. Since the data are quite old (up to 2013) they only show the situation before the last updates of the regulations, the expert from RISE committed to start producing a revision of the report, with fresh data. He also informed that the fire suppression system is required by the Insurance companies since 2006.

The Scandinavian countries have a high rate of auxiliary heating systems that can sometimes take fire. The bus driver behaviour can be regulated via the Vienna Convention and the traffic rules.

Spain pointed out that the Euro5 and Euro6 requirements increased the temperature in the engine compartment, and that this can influence the number of fire events.

Conclusion on BMFE-06-09: RISE document to be posted on the website (as BMFE-06-09)

## 5. Regulation No.107 (Day 1)

### 5.1. Simulation and experiment

Overview on influence of fire extinguishers regarding fire events statistics [OICA]

Details on simulation regarding automatic roof hatches opening and safe escape [CLEPA/PlasticsEurope]

BMFE-06-07 (RISE)

BMFE-06-06 (PlasticsEurope)

RISE presented item 5.1 in BMFE-06-07. They insisted that the drawings are dated 2006.

The chair pointed out that there is no available correlation between the simulation and the real tests. RISE stressed that the simulations cannot indicate the state of situation in a particular situation, rather the trends when one criterion is varying. Simulating flame spread is too parameters-dependent, so does not provide reliable results. This study demonstrates that the flame propagation is mainly due to the ceiling materials and that the highest criticality for passengers is brought first by smokes toxicity and density while the thermal effect comes after. Ideally, from a pure flame propagation point of view, the ceiling should not contain any flammable materials.

It was pointed out that opening the roof hatches does not produce any “chiminea effect”. The difference in height between the doors and the hatches is too small for such an effect.

Chair: UN R118 currently addresses two configurations: horizontal burning behaviour and melting. The Chair wondered whether the UN R118 requirements may be too low when we see the results of the simulation? RISE could not provide any indication in this regard. The chair suggested to use the burning behaviour of the materials, around the values required in UN R118, as a criterion in the simulation. RISE committed to investigate internally.

Gerflor pointed out that such comparison is very difficult because of the very different qualities of the materials. The position of the sample, the type of fire ignition, etc are too diverse. The expert stressed that the test method within one standard is a key parameter for the relevancy of the results. Hence the simulation from RISE should not be used with the requirements in UN R118. Similarly, it appears that using the data from UN R118 as base data for the simulation is not possible.

S pointed out that the Revision 3 of the 58 Agreement contains some provisions for simulations, hence such approach could be introduced into UN R118.

Chair: based on the positions discussed between experts, the 1<sup>st</sup> step should be to bring data showing evidence that the current test protocols and conditions are not adapted to the UN R118 scope. If this is confirmed, then the group could work on an adaptation of the test protocols.

There was a debate on the basic principles of the UN R118 requirements. Spain pointed out the

additional burden of the change to include the vertical burning behaviour, and stressed that the manufacturers are currently investing millions of Euros for passing to the new Annex 6 configuration. Changing the philosophy of the regulation should not be done before the results of these investments are known.

Yet the chair believed no other group than BMFE could assess the regulation principles validity. He added that the BMFE group should build the status of the regulation, then check whether it is in line with the aims of the regulation. He also wondered whether there is any blocking point for some items (e.g. ceiling burning behaviour, etc.).

#### Conclusion:

- The investments of the manufacturers in UN R118 should not be forgotten in the work of the informal group.
- In addition, the results of these investments should be assessed in the next [10 years]
- This does not prevent the BMFE informal group to undertake an assessment of the relevancy of the UN R118 approach according to the last researches, and then edit a state of play with regard to the objectives of the regulation
  - o GERFLOR to clarify at next informal group meeting why UN R118 may not be adapted
  - o GERFLOR: ready to establish a preliminary assessment of R118 for floor, ceiling, walls, but not for the seats.
- It will be up to GRSG to decide whether the philosophy of the UN R118 should evolve according to the outcomes of the informal group assessment.

#### BMFE-06-06

As PlasticsEurope could not attend the meeting, the chair suggested keeping this document as a reference for the parties.

#### Conclusion:

- All to provide input they believe relevant to PlasticsEurope for the next meeting
- PlasticsEurope to present the outstanding items at the next meeting.

#### 5.2. Full scale test

Synthesis of the project status [Aguila]

Vehicle availability [Volvo / Aguila / Chair]

#### **BMFE-06-10 (AGUILA)**

#### **BMFE-06-07 (RISE)**

RISE presented the 2nd part of the document BMFE-06-07. The expert pointed out that the test

might not be fully representative since the fire was initiated in a luggage compartment at the rear of the vehicle, with not all features as e.g. no isolation layer, that can be found in a real engine compartment. In addition, the smoke spreading in the passenger compartment does not come from the interior components, rather from the luggage compartment components. RISE informed that the test was rather expensive partially because it was performed indoor.

OICA pointed out that the insulation materials are mounted on a voluntary basis by the manufacturers, i.e. the UN R118 requirements on the isolation materials are “if fitted” requirements. S pointed out the paragraph 7.5.1.3. of R107 mandating resistance to fire.

It was pointed out that the value “T0” does not have the same definition in the table of the chair document (BMFE-06-05), and that of BMFE-06-07. The detection time is important, as well as the time as from which the smoke can be detected from the outside of the vehicle (alert by other road users).

Spain raised that the fire extinguisher is already mandatory hence the solution already exists.

OICA stressed that a spark coming from a short circuit does not produce a lot of heat nor smoke. Yet this is a fire.

Aguila presented BMFE-06-10

The vehicles were about 10 k€ each. Hence need to have a clear vision of the objective of the test. In Bordeaux they simulated the Puisseguin scenario by inserting a passenger car under the coach vehicle, and igniting fire in the passenger car. The chair called up the participants to provide support to Aguila for the test phase.

Aguila committed to provide a better view of the necessary budget for the next meeting.

The group acknowledged that these real scale tests can be a basic material for assessing the simulation. Broken windows could help evacuating both the smoke and the occupants.

Conclusion on logistic full-scale test:

- Interested parties to contact Aguila for bringing support or requesting other input
- Good opportunity for the group to get involved into the process

### 5.3. Simulation tool

Feedbacks and positions from experts on the need for such approach

Opportunity of CAE evaluation for the full-scale test purpose [Aguila / PlasticsEurope]

Analysis on similar studies performed by LNE [CLEPA / Gerflor]

BMFE-06-02 (Gerflor)

RISE supported the opinion that the scenario 2B is relevant for the fire event in a bus/coach

The chair pointed out that in a vehicle the chronology can be different since the ignition of fire is at

a higher distance from the occupants. There was a lengthy debate on the distance to the origin of the fire.

The discussions tended to conclude that:

- If the fire starts in the engine compartment, the toxic effect is predominant
- If the fire starts in the luggage compartment, the thermal effect is predominant.

The Chair stressed that the group should focus on the statistically relevant scenario i.e. the engine compartment-initiated fires.

RISE experiment provides indication of the most critical scenario. OICA informed that the compartment design is changed since the Euro6.

Conclusion:

- 1<sup>st</sup> phase: informal group to start with fires initiated in the engine compartment in bus & coach situations:
  - o Insulation of engine compartment is such that the thermal effect is not predominant
  - o Smokes will chronologically appear first in this scenario
  - o Luggage compartment is a worst case of the engine compartment, yet is not statistically representative.
- 2<sup>nd</sup> phase: more critical situations like the fires initiated in the passenger compartment.

#### 5.4. Outcomes of research on the time needed to break windows

Group is expected to be informed of new inputs available [RISE]

Item removed from the agenda

#### 5.5. Automated emergency exit

Feedback from experts on the last proposal version as amended during BMFE 05 session (BMFE-05-10)

#### BMFE-06-11 (Chair) UNECE 107 Draft updates

The group reviewed document BMFE-06-11 from the chair. A debate took place as to whether the proposal should address all the power operated exits.

Conclusion: exits to replace doors.

#### 5.6. Combination of fire detection and fire suppression warnings

Draft proposal on combination of fire detection and fire suppression warnings to the driver [OICA]

## Draft proposal on minimal performance level for fire detection systems [OICA]

BMFE-06-08 (OICA)

BMFE-06-15 (S)

OICA presented the document BMFE-06-08.

S reminded that some fire suppression systems have their own warning systems, and the proposal should cover them. The fire suppression system may activate before the excess of temperature is reached, in this case the excess of temperature is never reached. The driver should be informed that the fire suppression system is activated. The concern is that this is not tested in Annex 13.

The group agreed to include “**Any activation of the fire suppression system shall be signalled to the driver**” into the OICA proposal, as a separate requirement.

Debate on the “*technology different to*”:

- Make it a scientific reasonable approach
- Chair wondered whether a new test protocol should be developed for addressing this.
- Regulation is already complex enough; the requirements should be reasonable and technology neutral. Proposal from Sweden to add this in the analysis section (paragraphs 7.5.1.5.2.1. to 3. or paragraph 7.5.1.5.4.2.).

RISE pointed out that the current proposal indicates that the detection system must be triggered by a temperature detection system, while there are other technologies.

Some experts also stressed the question about which particular spot should be addressed by the temperature detection system. Some proposed to separate the spot location paragraph.

Sweden prepared overnight a new proposal per document BMFE-06-15. The alarm system has a broader scope than the fire suppression system hence it makes it relevant. Proposal: “The fire suppression system may alternatively be activated automatically by other means, as long as it activates the alarm system.”. the group wondered the series of amendments relevant for such change.

## Conclusion:

- Keep current wording for the alarm and fire suppression system
- The group agreed to internally check the addition of “**The fire suppression system may alternatively be activated automatically by other means, as long as it activates the alarm system.**” into the OICA proposal, as a separate provision. Decision to be made at the next meeting.
- Separate the provisions for checking the different temperatures associated to the different relevant spots
- OICA still the pilot for this item

RISE presented their proposal for checking the fire detection system per their PPT presentation BMFE-06-07 pages 44 to 49. The proposal is based on the same principles as the fire suppression system check.

OICA claimed having installed fire detection and suppression systems for more than a decade on a voluntary basis, with no concern nor claim from the market. So there is no need to regulate this system. The system functions well without any further check. RISE pointed out that the proposal permits guaranteeing a certain level of performance.

The chair suggested a compromise, with the OICA proposal to check the adapted temperature in the associated spots. RISE stressed that the solution should be technology neutral such that the manufacturer have full choice on the technology. S pointed out that there exists some fire detection systems smarter than the excessive temperature detection, and that the text should permit them.

The chair proposed that OICA and S collaborate on this topic.

#### General conclusion:

- Item remains in the agenda
- Keep the proposal based on the temperature, keeping the door open for other means.
- RISE and S to provide support to OICA for elaborating a proposal capturing any technology detecting a fire ignition

#### 5.7. Safety instructions

Feedback from experts on the last proposal version as amended during BMFE 05 session (BMFE-05-11)

#### BMFE-06-11 (Chair) UNECE 107 Draft updates

The chair introduced the subject.

CLCCR challenged the wording in a Type Approval regulation, as all manufacturers already comply with these requirements. However, the proposal was acceptable to OICA and hence made no problem to the group.

Conclusion: proposed wording adopted., yet “user” should be replaced by “operator, driver and/or crew” for best consistency with the rest of the regulation

#### 5.8. Optimization of luminous trajectories and functionalities (flashing lights for ex.)

This item was not discussed in detail. The chair suggested keeping it in the agenda for the next session, calling each party to provide input ahead of the June meeting.

## 5.9. Smokes extraction systems

### BMFE-04-03 (UTAC)

The chair presented the document and requested opinions as to whether the approach could be beneficial to the automotive sector.

OICA pointed out that the already agreed automatic opening of the roof hatches is already a 1<sup>st</sup> start of this approach.

Conclusion: all to provide input to the chair.

## 6. Regulation No.118 (Day 2)

### 6.1. Smoke density [opacity](#) : analysis and draft proposal on the most adapted protocol for road application [CREPIM / CLEPA / Gerflor]

#### BMFE-06-03 (Gerflor)

The Gerflor expert clarified that smoke density is not used in the building sector.

The chair recalled his initial request to identify the best adapted parameter for smoke density, based on the accident factors discussed under UN R107 data, taking into account the data provided by this presentation. D recalled the outcomes of the Madrid meeting (BMFE-05): “The experts agreed that the timing is a key parameter and concluded that time and “irradiation” are the parameters to focus on.” In addition, there is a balance to find out of the three parameters: flame spread, smoke toxicity and smoke density, while it is virtually impossible to make an economic material good in all the three parameters.

Conclusion:

- BMFE to aim finding the proper balance between the 3 parameters, adapted to the accident scenarios of bus & coach applications
- D to start a study with this balance analysis, and share preliminary results at the BAST meeting (7<sup>th</sup> meeting)
- Latest version of UN R118 to be taken as a basis

### 6.2. Smoke toxicity: progress of the development of a simplified method for interior materials used in buses and coaches [D]

The group was informed that the project did not start yet, however could start in April for a duration

of 10 months. D promised to keep the BMFE updated, perhaps the involved experts could attend the BASt meeting in June.

Conclusion:

- Item kept in agenda
- Update expected at next session
- BMFE experts are free to contact BASt for any request.

6.3. Analysis of other transport modes: comparison matrix (cost for each application vs. the materials) based on the available data [CLEPA / OICA]

BMFE-06-13 (OICA) Comparison trsp modes

OICA presented the table BMFE-06-13. The expert clarified that this is a 1<sup>st</sup> attempt, subject to comments. The expert committed to further work on this topic. The group acknowledged that different industries lead to different requirements.

Gerflor pointed out that the new EU regulation lead that H&S (health and safety) for air and rail are identical.

The expert was open to any constructive input regarding the document.

Formaldehyde (H-CHO) and flame retardants are the two major components detrimental to H&S.

Gerflor insisted that the H&S column is an important item in the comparison.

Conclusion:

- Living document
- All participants to provide their input if any
- Item remains in the agenda

6.4. Influence of adhesive agent : to provide a draft proposal with addition of a new item 5 in Annex 2 for an associated adhesive agents list [S]

BMFE-06-04 (Sweden)

S presented their proposal, merely based on the wording proposed in the minutes of the last meeting. Some experts requested precision on the level of details to be given when addressing “agent”. While “adhesive agent” is quite generic, the level of granulometry to be required in the regulation is difficult to identify.

CLCCR informed needing to have internal revision before endorsing the proposal. The chair was keen that the issues do not remain in the agenda of the group for each meeting, preventing the group

from making progress. The Secretary suggested to give 2-3 weeks reflexion to the participants before the informal group table a proposal as an informal document to GRSG-116 in April this year.

Conclusion:

- Wording adopted as amended
- If comments, participants to contact the chair and secretary before 15 March 2019.

Note of the Secretariat: CLCCR subsequently distributed comments per an email dated 14 March 2019, reading:

*“CLCCR had a conference call yesterday on the influence of adhesive agent. CLCCR is of the opinion that the Swedish proposal (document BMFE-06-04) only adds a requirement for "a list of adhesive materials that are to be used ...", but does not really solve the issue how to establish in a coherent way that an adhesive agent deteriorates the burning behaviour of the material.*

*So, CLCCR proposes in a first step to introduce a test method for the adhesive agent as a component, e.g. the ISO 11925-2:2010. Requiring a material tested to an ISO standard is a clear requirement for the supplier, without having to comply with elaborate COP-requirements. With this proposal comes a question, what are the experiences of other manufacturers and suppliers with this test method ISO 11925-2:2010 if possible for an adhesive agent?”*

## 7. Next steps

BMFE to table a synthesis of the 05<sup>th</sup> & 06<sup>th</sup> sessions, for GRSG-116 of April 2019

## 8. Next meetings

### 8.1. 7<sup>th</sup> meeting

1 and ½ day meeting on 25-26 June starting at 9:00 am on the 25<sup>th</sup> and finishing at lunch on the 26<sup>th</sup> in BAST (Bergisch Gladbach)

### 8.2. 8<sup>th</sup> meeting (TBD)

## 9. A.O.B.