Daimler Comments on the Draft JRC Report (10-Dec-2013)

Mercedes-Benz R&D
Daimler AG
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Mercedes-Benz

Comments on pre-test to determine refrigerant release test target temperatures

- We do not consider it appropriate to conclude driving speeds are not “realistic” because they are allowed only in Germany and the Isle of Man. Highway traffic in Germany certainly accounts for a non-negligible portion of EU highway traffic.
- Furthermore, vehicles allow for certain high speeds and it is clearly part of the manufactures due care obligation to ascertain that they can be safely driven at speeds they are capable of.
- Daimler´s testing has clearly shown that the highest temperatures in the engine compartment are not achieved at maximum speed but rather under dynamic driving conditions with repeated strong accelerations. In that sense, the temperatures determined by the KBA tests were not the maximum achievable which in turn makes the approach to choose 50 ℃ below the temperature at high speed even more realistic.

Comments on pre-test to determine refrigerant release test target temperatures (2/2)

- The conclusion that it is “not very likely to reach the assumed impact speed of 40 km/h in a collision when driving uphill” is a subjective assessment lacking scientific foundation. Modern vehicles are clearly more than able to pull a trailer uphill at speeds well above 40 km/h. Furthermore, it has to be differentiated between vehicle speed and impact speed. In a frontal collision with an oncoming vehicle even a vehicle driving rather slowly uphill can still experience a high collision speed depending on how fast the downhill vehicle was.

In summary, we conclude that both the test temperatures as well as the chosen collision speed are certainly realistic with regard to their possible occurrence in real traffic. They even stay a clear margin away from a worst case consideration. A sound evaluation of the probability of these conditions is complex and only achievable on the basis of accident statistics and objective measurements. Therefore it would be negligent to exclude these aspects in a serious consideration.

Comments on crash tests (1/3)

- The statement “The driving force behind the tests carried out under level 3 is engineering curiosity, test show a strong research character by going clearly beyond the boundaries/limitations set for level 1 and level 2 testing (and assumed to be realistic)” is an assumption without supporting evidence and as such is not appropriate for an official report.
- From our point of view, accidents with higher severity in other configurations will happen, so level 3 partially addresses the cases which are not covered by the KBA chosen crash test. Other constellations (pole impact, oblique, etc.) can lead to other damages in the AC system. Therefore, a slight extrapolation of damages in the chosen scenario is not “engineering curiosity” but a well-founded attempt to cover a slightly larger portion of what will happen in the real world. We consider such extrapolation a typical due-care type approach which is commonly used also by vehicle manufacturers when evaluating vehicle safety issues.

Comments on crash tests (2/3)

- It is extremely difficult to forecast what type or combination of damages will occur in an accident. We note, however, that Daimler´s tests showed inflammation events in several configurations:
  - Damage of condenser only
  - Damage of refrigerant line only
  - Damage of both condenser and refrigerant line.
- The statement “Other fluids and other solid materials might burn and might release as well harmful substances when burning” misses an important point. When introducing new technology, vehicle manufacturers always have to consider the state of the art which in this case is the non-flammable refrigerant R134a. The very intense inflammation observed in some of the level 3 tests as well numerous tests by Daimler and others (cf. test reports submitted to JRC) is an added risk compared to the state of the art which must be avoided. Note also that there are no non-flammable alternatives available for fuels or oil.

Comments on crash tests (3/3)

- From the above we seriously question the last conclusion “Due to the assumed clear research nature of level 3 tests the drawing of further conclusions regarding future safe operation of the refrigerant seems therefore not appropriate / not advisable / questionable”. Level 3 testing as well as tests performed by Daimler and others showed that there is an increased risk of inflammation in comparison to R134a without attempting to quantify that risk. This must be done in a conservative fault tree analysis as has been carried out by some institutions.

Comment on last paragraph

Concerning the statement “ca. 700 °C needed for ignition” we stress that the number of tests from KBA is not sufficient to deduce such confirmation. We point out that in Daimler´s testing there have been numerous inflammations below 700 °C with the lowest observed temperature at 635 °C.

General comments (1/2)

- The draft report was already prepared before and presented during the second of three meetings before all arguments were presented. This automatically bears the risk of a limited and narrowed view.
- The JRC only evaluates the tests performed by KBA, which represent only a small subset of all studies and tests that have dealt with the safety aspects of R1234yf nearly over the last 2 years.
- The JRC hence does not honor the materials which were submitted upon JRC's own request at the beginning of the activity. Following this request, Daimler submitted:
  - A test report explaining in detail the different test variations which Daimler performed in order to evaluate the influence of various parameters (location of refrigerant leakage: condenser, lines in engine compartment, effect of coolant leakage, Diesel vs. Gasoline) on the inflammation.
  - A 2nd test report showing results from further tests that Daimler performed.

General comments (2/2)

- We are further aware that the JRC received from other stakeholders information about projects which dealt with safety questions regarding R1234yf and are not reflected in this report.
- Further existing tests and studies from academia and environmental NGOs have either not been requested or not been recognized/admitted for reasons unknown to us at the present time.
- The KBA´s request for further studies based on level 3 tests is unfortunately completely disregarded by classifying it as “engineering curiosity”. From our point of view level 3 testing has real world relevance and has to be considered.