



AECS-05-04

# OICA Proposal for AECS part II Vehicle Approval

# Scope for Vehicle System Approval (with approved Device)

Scope	All M1 and N1 vehicles				
Type of triggering	Automatic and manual				No eCall
Vehicle category	M1 < 2,5 t and R < 700mm	M1 < 2,5 t and R > 700mm	M1 > 2,5 t and R < 700mm; N1 < 700mm	M1 > 2,5 t and R > 700mm; N1 > 700mm	
	Included in the scope of <b>R94 and R95</b>	Included in the scope of <b>R94 only</b>	Included in the scope of <b>R95 only</b>	Not in the scope of R94 and R95 but <u>with trigger</u>	Not in the scope of R94 and R95 but <u>without trigger</u>
Testing triggering	R94 and R95	R94	R95	n/a	n/a
Assessment after full-scale crash test	Demonstrate: Triggering occurred, test call can be established, subjective audio check, and successful MSD transmission			No assessment	-
Assessment of manual trigger	Demonstrate: Triggering occurred, test call can be established, subjective audio check, and successful MSD transmission				-

## **Additional concern:**

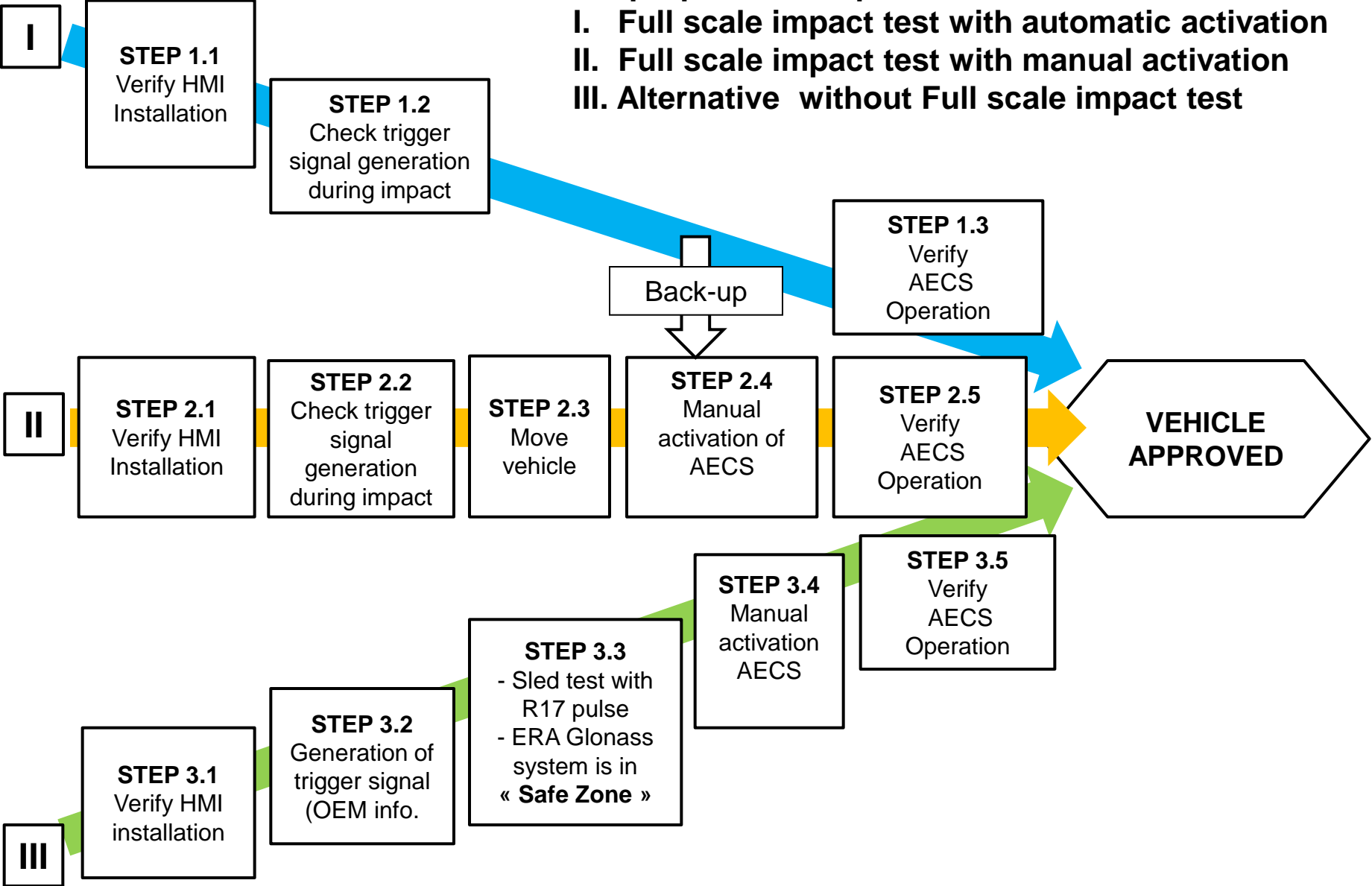
**-How to exclude vehicles that are exempted by regional type approval regulation from the requirements of frontal- and side collision according to ECE-R 94/95 (e.g. special purpose vehicles).**

**-Address N1 vehicles that can meet ECE-R 95 without using a side airbag**

# Vehicle testing procedure (with approved Devices)

We propose 3 test procedures :

- I. Full scale impact test with automatic activation
- II. Full scale impact test with manual activation
- III. Alternative without Full scale impact test

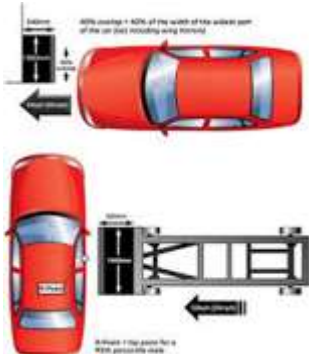


# I. Full scale impact test with automatic activation

**I** **STEP 1.1**  
Verify HMI  
Installation



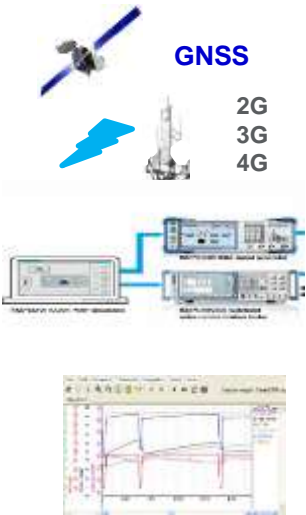
**STEP 1.2**  
Check trigger  
signal generation  
during impact



**STEP 1.3**  
Verify  
AECS  
Operation

**VEHICLE  
APPROVED**

- Verify by one of options:**
- 1. **Actual** GNSS, MNO, PSAP ⇨
  - 2. **Simulated** GNSS, MNO, PSAP ⇨
  - 3. **Functional** check ⇨



# I. Full scale impact test with automatic activation

## STEP 1.1: Verify HMI installation

According to requirement of par. 15.1.5 - 15.1.8 (AECS control and indicator) R121

## STEP 1.2: Check generation of trigger signal during frontal (ECE 94) and/or lateral (ECE 95) impacts

### [UN ECE 94-02 needs to be amended as follows:

**Par. 2.36 AECS trigger signal:** *a signal that can be used to trigger an AECD/AECS defined in UN ECE ???.*

**Par. 5.2.9:** *If requested by the manufacturer, the technical service shall verify the availability of an AECS trigger signal generated during the test of the vehicle carried out in accordance with the method described in Annex 3.*

*The signal specification and the method to verify the availability will be provided by the manufacturer. In case the vehicle was already approved to this Regulation this verification of the AECS trigger signal shall not require a new test according to annex 3*

**Annex 1, Par. ??:** *AECS trigger signal yes/no]*

### [UN ECE 95 -03 needs to be amended as follows:

**Par. 2.36 AECS trigger signal:** *a signal that can be used to trigger an AECD/AECS defined in UN ECE ???.*

**Par. 5.3.8:** *If requested by the manufacturer, the technical service shall verify the availability of an AECS trigger signal generated during the test of the vehicle carried out in accordance with the method described in Annex 3.*

*The signal specification and the method to verify the availability will be provided by the manufacturer. In case the vehicle was already approved to this Regulation this verification of the AECS trigger signal shall*

Pending review by  
GESP/GRSP

# I. Full scale impact test with automatic activation

## STEP 1.3: Verify AECS operation

Baseline is to verify the capability to

- Generate and initiate the transmission of an MSD
- Initiate a 2-way voice connection

**Option 1.** Use of actual GNSS signal, Mobile Network and PSAP (via a dedicated call number )  
comment

- Test is close to « Real world »
- Only possible if a reliable GNSS signal and a reliable mobile network access are available at the R94/R95 impact facility

# I. Full scale impact test with automatic activation

## STEP 1.3: Verify AECS operation

Baseline is to verify the capability to

- Generate and initiate the transmission of an MSD
- Initiate a 2-way voice connection

**Option 2.** Use of simulated GNSS signal, Mobile network and PSAP

### Comments:

- Not depending from external « real world » environment
- needs to be performed in a shielded or anechoic room to avoid interference with “real world” environment
- Shielded room needs to be equipped with a simulator of GNSS, MVNO and PSAP

# I. Full scale impact test with automatic activation

## STEP 1.3: Verify AECS operation

Baseline is to verify the capability to

- Generate and initiate the transmission of an MSD
- Initiate a 2-way voice connection

**Option 3.** Functional check via one out of the following four methods  
(Use of simulated GNSS signal, Mobile network and PSAP )

The actual AECS operation has already been verified a Device certification level (part I).  
There for it is sufficient to verify the function of every relevant AECD component in the vehicle.

Check of functional state of the in-vehicle system by using HMI (visual control of telltale)

or

Check of functional state of the in-vehicle system by internal memory checking

or

Check of functional state of the in-vehicle system by separated functional test

or

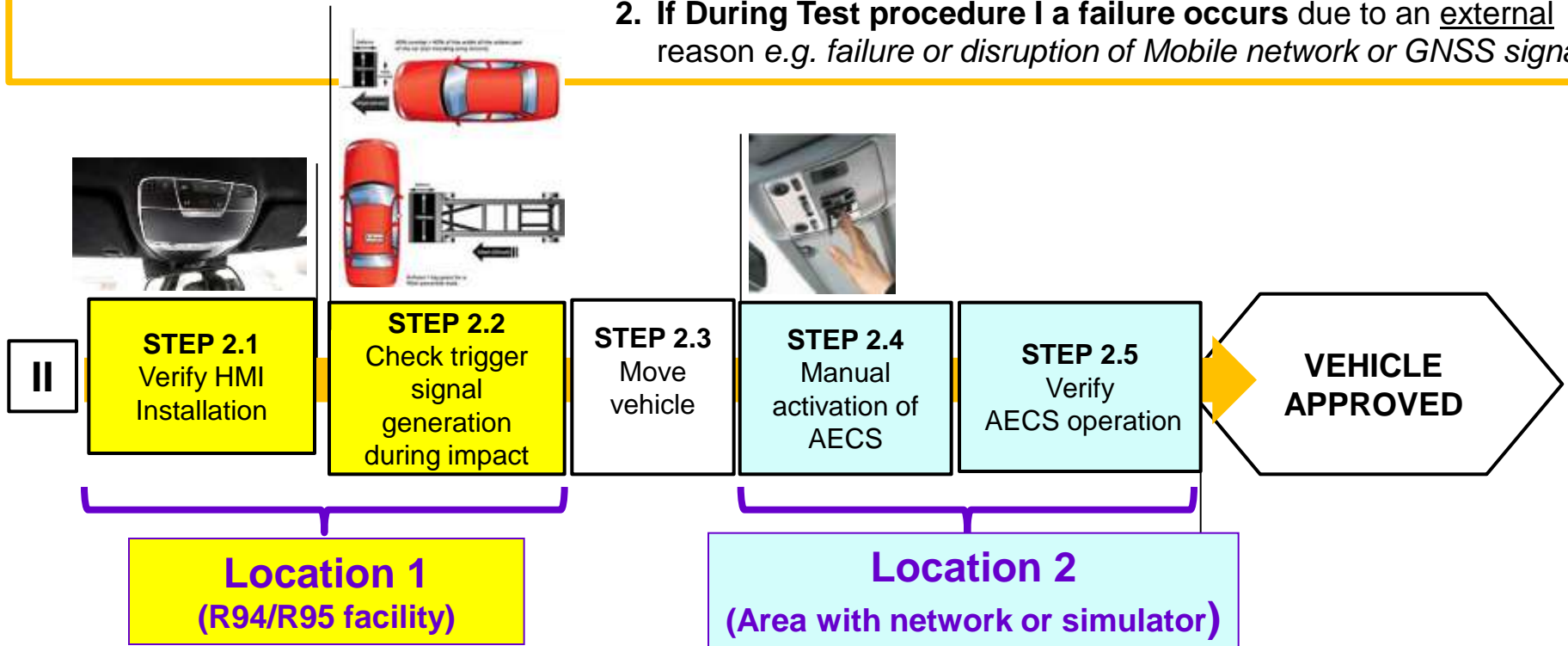
Check of functional state of the in-vehicle system by functional transmission test with  
Wired procedure



# II. Full scale impact test with forced activation

To be used in following case:

1. If the Impact facility has no possibility to simulate Mobile or GNSS environment or has no reliable access to Mobile or GNSS environment
2. If During Test procedure I a failure occurs due to an external reason e.g. failure or disruption of Mobile network or GNSS signal



Verify by one of options:

1. Actual GNSS, MNO, PSAP ⇒



2. Simulated GNSS, MNO, PSAP ⇒



## II. Full scale impact test with manual activation

**STEP 2.1: Verify HMI installation (same as step 1.1)**

**STEP 2.2: Check generation of trigger signal during frontal (ECE 94) and lateral (ECE 95) impacts (same as step 1.2)**

**STEP 2.3: Move vehicle to an area with network or simulated network access**

**STEP 2.4: Manual activation**

- 1. If the Impact facility has no possibility to simulate Mobile and GNSS environment or has no reliable access to Mobile and GNSS environment**
  - Impacted vehicle will be moved to a shielded room with simulator or to an area where Mobile and GNSS environment is available
- 2. If During Test procedure I a failure occurs due to an external reason**
  - No necessity to carry out new impact test,
  - the test procedure will continue by manual activation of AECS

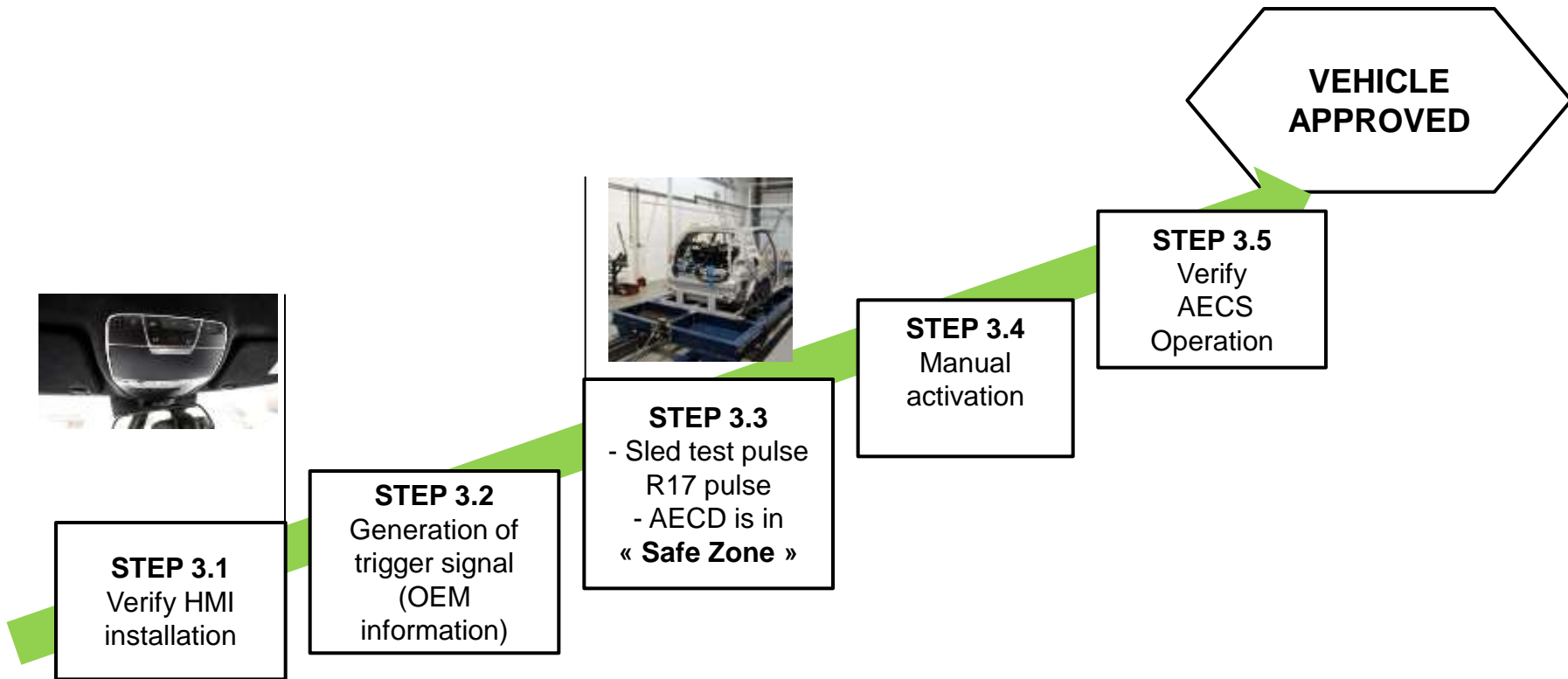
**STEP 2.5: Verify AECS operation (same as step 1.3, option 1 & 2)**

### III. Alternative without Full scale impact test

#### **ALTERNATIVE PROCEDURE TO APPLY IN CASE OF THE FOLLOWING SITUATIONS :**

1. Time gap between impact tests (ECE 94 / 95) and telematic device availability with regard to vehicle development schedule → see Annex 1
2. Technical and/or installation upgrade of telematic components during vehicle life
3. Extension of type approval for vehicle : in case of installation of already approved AECD on a vehicle type as defined in UNECE 94 and UNECE 95
4. As a choice by OEM for this alternative procedure

# III. Alternative without Full scale impact test



# Safe Zone borders:

*Draft  
Proposal*

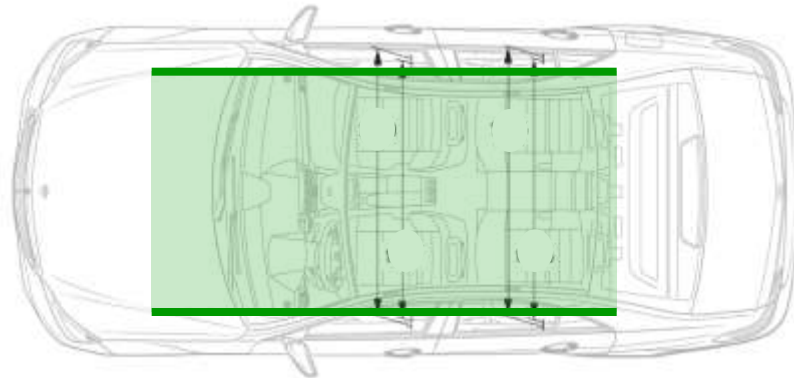
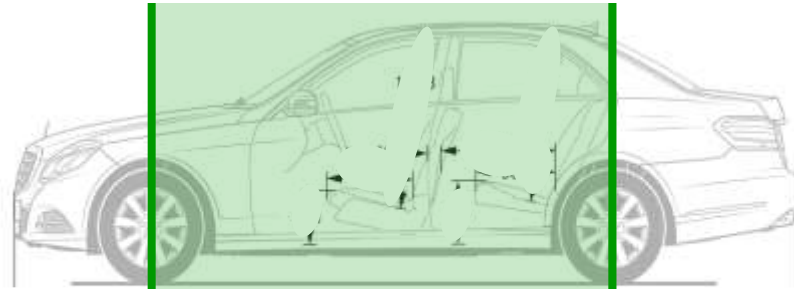
**X: front axle [and rear axle]**

**Y: between the two z-x planes crossing the outer surface of the driver's seat and crossing the outer surface of the outermost front passenger's seat**

If components of the E-Call system are out of the above defined area, the requirements are also deemed to be fulfilled, if the manufacturer can show to the satisfaction of the technical service that the post crash functioning is given.

This could be for example:

- Relevant components are in non-deformed areas
- Relevant functions are redundant
- Devices are mounted on/in windows (e.g. windshield, rear window, ...)
- .... (others, tbd.)



# Safe Zone borders:

Draft  
Proposal

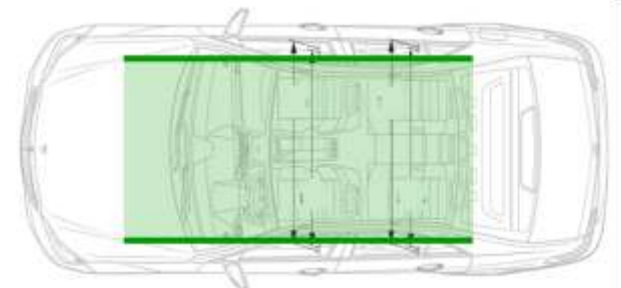
## Justification

- The concept of “Safe Zone borders” describes protection zones within the vehicles bodywork structure where deformation is unlikely according to real-world data
- In addition mechanical requirements (deceleration test according ECE-R 17, Annex 9) for AECS components ensure shock-proof protection in case of an accident

## Procedure

- A study [1] was conducted by analyzing the damages of approx. 9000 vehicles involved in severe real world accidents, using the German In-Depth Accident Study (GIDAS) data base
- For each vehicle the deformations in the lower vehicle level were plotted in a standardized 2-D grid
- By consolidating the resulting deformation matrix with the accident frequency and severity, the probability of the deformation of each vehicle cell in any crash type can be evaluated accordingly in a deformation probability matrix
- To reflect the relevance of deformation in particular regions a cumulative frequency matrix can be calculated
- The deformation characteristic of the car fleet changes over time depending on the improved crash structure in newer car models
- Therefore the 5<sup>th</sup> percentile of the cars registered 2000 and later is calculated and the result is shown in the image below:

Source: [1] SAE Paper  
**SAE 11B-0132 / 2011-01-0545:**  
Analysis of Fuel Cell Vehicles  
Equipped with Compressed  
Hydrogen Storage Systems from a  
Road Accident Safety Perspective



-According to this matrix the following Safe Zone borders are defined:

**X: front axle [and rear axle]**

**Y: between the two z-x planes crossing the outer surface of the driver's seat and crossing the outer surface of the outermost front passenger's seat**

**Data source:** (complete paper is subject to SAE copyright)



<b>Analysis of Fuel Cell Vehicles Equipped with Compressed Hydrogen Storage Systems from a Road Accident Safety Perspective</b>	2011-01-0545 Published 04/12/2011
<p>Joerg Bakker Daimler</p> <p>Christian Sachs Adam Opel AG - General Motors Company</p> <p>Dietmar Otte Medical Univ Hannover</p> <p>Rainer Justen Daimler</p> <p>Lars Hannawald VUFO GmbH</p> <p>Flavio Friesen Adam Opel AG - General Motors Company</p>	

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doi:10.4271/2011-01-0545

### III. Alternative without Full scale impact test

**STEP 3.1: Verify HMI installation (same as step 1.1)**

**STEP 3.2: Generation of trigger signal**

#### **Generation of Triggering Signal**

- The manufacturer shall demonstrate the generation of the triggering signal to the technical service in line with ECE 94 and ECE 95 provisions

**STEP 3.3: Sled test with pulse of ECE R17 Annex 9**

Verification that the AECD is installed in such a way as to be protected from the consequences of a collision to the front or side of the vehicle (Safe Zone)

**STEP 3.4: Manual activation (same as step 2.3)**

**STEP 3.5: Verify AECS operation (same as step 1.3)**



Back-up

# Scope for Vehicle System Approval (with approved Device)

M1 with a GWM < 2,5 t and a R point height of < 700 mm

N1 with a R point height of < 700 mm

Other vehicles of category M1 and N1 if fitted with a trigger system detecting at least one impact according to UNECE Regulation 94 or 95

Vehicles of other categories on request of the manufacturer

# Scope for Vehicle System Approval (with approved Device)

		Conditions from R 94	
		GVM < 2,5t	GVM > 2,5t
Condi tions from R 95	R < 700 mm	In scope of R 94 & R 95	In scope of R 95 only
	R > 700 mm	In scope of R 94 only	Not in the scope of R 94 & not in the scope of R 95

<b>Green colour:</b> Show compliance in the R 94 and R 95 test	<b>Yellow colour:</b> Show compliance in R 95 test only	<b>Blue colour:</b> Show compliance in R 94 test only	<b>Red colour:</b> OEM shall provide documentation showing that an ecall will be established
<b>For all: sled test with [75 g] has to be done with the eCall system</b>			