EURO NCAP

#FORSAFERCARS

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OEM Pre-test Data

Crash Protection

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PREFACE

During the test preparation, vehicle manufacturers are encouraged to liaise with the laboratory and to check that they are satisfied with the way cars are set up for testing. Where a manufacturer feels that a particular item should be altered, they should ask the laboratory staff to make any necessary changes. Manufacturers are forbidden from making changes to any parameter that will influence the test, such as dummy positioning, vehicle setting, laboratory environment etc.

It is the responsibility of the test laboratory to ensure that any requested changes satisfy the requirements of Euro NCAP. Where a disagreement exists between the laboratory and manufacturer, the Euro NCAP secretariat should be informed immediately to pass final judgment. Where the laboratory staff suspect that a manufacturer has interfered with any of the set up, the manufacturer's representative should be warned that they are not allowed to do so themselves. They should also be informed that if another incident occurs, they will be asked to leave the test site.

Where there is a recurrence of the problem, the manufacturer's representative will be told to leave the test site and the Secretary General should be immediately informed. Any such incident may be reported by the Secretary General to the manufacturer and the person concerned may not be allowed to attend further Euro NCAP tests.

DISCLAIMER: Euro NCAP has taken all reasonable care to ensure that the information published in this protocol is accurate and reflects the technical decisions taken by the organisation. In the unlikely event that this protocol contains a typographical error or any other inaccuracy, Euro NCAP reserves the right to make corrections and determine the assessment and subsequent result of the affected requirement(s).

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1 INTRODUCTION

In order to expedite the vehicle assessment, certain information is required in order to correctly prepare and rate the vehicle. In addition to the passenger compartment adjustments specified in each of the full-scale test protocols, the following information will be required from the manufacturer. A copy of vehicle handbook should be provided to the test laboratory prior to preparation.

Some of the questions are asked routinely during one-to-one meetings. It is hoped that, if satisfactory information can be provided before the inspection, a meeting may not be needed or may at least be shorter and more efficient than would otherwise be required. Some sections may not be applicable to a vehicle. In this case you should indicate the reasons why you have not completed that part (e.g. no dual stage airbag).

The information should be provided in electronic form, by e-mail, to the Programme Manager and test laboratory.

2 APPLICATION OF EURO NCAP STAR RATING

2.1 Details of vehicle model range

The vehicle manufacturer shall provide details of all variants in the model range being tested by Euro NCAP.

Powertrain - E.g. full electric, 1.4 litre petrol, 2.0 litre diesel, hybrid.
Transmission - E.g. Manual, automatic, 2WD, 4WD
Body - 5 door, 3 door, convertible-cabriolet
Trim levels
Safety equipment on each variant/trim level

2.2 Other variants

The star rating of the tested variant can be considered to apply to other variants meeting certain criteria regarding mass, number of side doors etc. For other variants, additional evidence may be needed from the manufacturer to demonstrate that the rating applies. In some cases, additional official tests are needed (e.g. electric/hybrid variants where a conventionally-engined vehicle was assessed, two side doors where a vehicle with five side doors was assessed).

3 OEM INFORMATION

3.1 General items

Will the vehicles be delivered in shipping mode or customer mode?

If vehicles are delivered in shipping mode, is there a need to switch to customer mode (influence on the firing of the airbag)? If yes, please provide additional info on how to change mode (picture of the fuse box and the fuse to change…)

If vehicles have shipping mode, detail how to check the car is NOT is shipping mode.

3.2 Vehicle specification

Powertrain
Transmission
Vehicle overall width (without rear-view mirrors)
Fuel tank capacity
Unladen kerb weight of test variant
Tyre pressures (front/rear)
Suspension geometry to ensure correct alignment
Ride height for normal driving if adjustable manually or with vehicle speed
List passive safety equipment (airbags, belts) & type for front seats

Is the vehicle equipped with High Voltage power (hybrid or full electric) or with fuel cell (Y/N)?
If so, the laboratory will provide the OEM you with internal safety procedures.

For ICE vehicles, please specify the number of batteries equipped in the vehicle and voltage & location of each.

Automatic door locking ADL

Is ADL fitted as standard?
Is ADL default always ON? I.E even if ADL is turned OFF for one journey, the ADL will automatically turn ON at the next start of engine/motor ON.
Provide details of any means to de-activate ADL allowing the laboratory to check the default ON status (if no deactivation possible, put N/A).
Provide instructions to activate ADL both when the car is moving and stationary.
Provide instructions to retract the door handles without locking doors in case of retracting door handles.

e-Call systems

Is the vehicle equipped with an e-Call system?
If yes, please provide information on how to deal with the system (call of 112 service? Deactivation? Change of telephone number?…)
If yes, does the MSD includes the information on Direction of Impact & Delta V?
If yes for MSD content, is the vehicle accessible via the BOSCH CDR (Crash Data Retrieval) tool?

If not listed in CDR, can you send the equipment to read the Direction of Impact & Delta V information from the car?
If not, the Lab may not be able to provide the information to assess this point in the Post Crash assessment.

Passenger airbag disabling

Is the vehicle equipped an automatic airbag deactivation system for front passenger (Y/N)?
If so, provide details of how the laboratory can ensure that the airbag will be active during the MPDB and FWDB tests?

Child Presence Detection CPD
Is the vehicle equipped a Child Presence Detection (CPD) system (Y/N)?
If CPD system is present, please answer the questions in the Child Protection section below.

Easy entry functions

Is the vehicle equipped with any easy entry function that may be activated during the crash preparation (e.g. moving the seat once the dummy is already positioned)? (Yes/No).
If applicable, provide additional information on how to deal with the system to prevent it to be active in the full-scale crash tests.
If there is an easy entry function, will it revert back to “Default ON” when the low voltage battery is disconnected and reconnected again?

3.3 VUT preparation

Provide driver airbag removal instructions.

Provide torque magnitude for driver seat anchorage fasteners.

Does any test vehicle have a sunroof or large glazed roof (Y/N)?
Is roof drilling allowed to fix the on-board cameras and in which zone?

Is the vehicle equipped with a centre airbag (also named Far-Side / Occupant to Occupant / interaction Airbag)?
If yes, provide specific location(s) and information about its size and the risk of interaction with on-board cameras and lights.
Location of secondary pre-tensioners for front seating positions

Provide instructions on how to install the sensors to monitor the vehicle battery voltage

Please provide the Rescue Sheet 1st page and chapter 3 to give details about the HV energy deactivation possibilities

Provide details of B-pillar accelerometer positions used in OEM far side sled tests. Accelerometer positions in the full scale tests must be similar.
Provide details of any likely ringing/interference for B-pillar pretensioners.

There remains the possibility the ADAS vehicle will have to be used for crash test (in case of retest due to a lab error for example). For installation of ADAS braking robot, the front seat fasteners may be removed and reattached.

Please provide the vehicle reference coordinates system for full scale crash tests.

In order to ensure a good quality of the reference coordinates system, there is a need to use four accessible vehicle reference point coordinates to create and check the system.

Provide the vehicle reference coordinates system for VRU impactor tests. This required at minimum of three vehicle reference point coordinates to link in the front-end zone of the car. Give the name of the file where the vehicle reference points are presented.

Is the vehicle likely to be considered as limited rear space in any of the impacts? If yes, provide details.

3.4 Safety critical

Provide Rescue Sheets and Emergency Response Guide.

Provide battery cut-off details for electric vehicles.

Provide specific details of Direct Hazard Disabling Equipment Labels in the vehicle including number and locations (Y/N)?

Complete the EV questionnaire detailed in Appendix A.

3.5 Test preparation

Detail the process for ignition or contact ON - Provide a picture of the dashboard screen when ignition or contact ON.

Is there an Energy saving mode system that may influence the ignition or contact ON before test? For example, does the vehicle automatically switch OFF a number of minutes after being switched ON? If so, provide information of how to avoid the car going into sleeping mode before the crash. Instructions to get the software / firmware version of the tested car when the car is equipped with OTA (Over The Air) update.

Is it necessary for the engine to be running for any tests?

Pre-crash and ADAS systems

Provide pre-crash system disabling instructions.
Does the vehicle have a pre-crash system that would be activated in a Crash Avoidance test (eg. Reversible Buckle)?
Does the vehicle have a pre-crash system that may influence the crash (eg AEB for a frontal test)?
If applicable, provide additional information on how to deal with the system to prevent it to be active in the full-scale crash tests.

Front impacts

Are the curtain airbag(s) expected to deploy during the frontal impacts (Y/N)? If so, detail which test and which side of the vehicle?

Are the front seat row side airbags (near side, central or far side) expected to deploy during the frontal impacts (Y/N)? If so, detail which test and which side of the vehicle?
Are any rear seat row side airbags expected to deploy during the frontal impacts (Y/N)? If so, detail which test and which side of the vehicle?

Is there a preferred dummy cable routing (on the inboard or the outboard of the car) for front seat occupants? If so, provide pictures.

Seat fore/aft

Front seat fore/aft MDP for 5th percentile occupants.
Front seat fore/aft MDP for 50th percentile occupants.
Front seat fore/aft 95th percentile position occupants.
Distinguish between driver and front passenger seats where applicable.
When setting seat fore/aft seat rail adjustments/measures are required, H-point coordinates are NOT required.

Seat cushion tilt

Front seat base tilt for 5th percentile occupants.
Front seat base tilt for 50th percentile occupants. Note, this is NOT applicable in an AE-MDB or Pole impact where protocol imposes mid tilt.
Front seat base tilt for 95th percentile occupants.

Seat torso angle

Front seat torso angle MDP for 5th percentile occupants.
Front seat torso angle MDP for 50th percentile occupants. This will be applicable to all 50th percentile occupants in the full scale tests.
THOR torso design tilt angle (around Y, in °) (not mandatory)
Front seat torso angle 95th percentile position occupants.
Detail if the torso angle is to be measured from absolute or relative to the sill (which part of the sill)?

Seat belt anchorages

50th percentile seat belt anchorage position.

For THOR dummy, is it expected that the diagonal seatbelt may become trapped between the neck and shoulder?

Steering wheel

Steering wheel position in X for 5th percentile occupant (it's ONLY when there is NO OEM position for 5th percentile in X, that the steering wheel will be adjusted to get 250 mm between dummy and centre of steering wheel)

Rear seats

Rear seat back/torso angle for 5th percentile occupant

AE-MDB test

As detailed for front and in addition:

Is the non-struck side curtain airbag expected to deploy during the AE-MDB test (Y/N)?

Height of any non-adjustable versions of front seat.

R-point coordinates (X and Z).

R-point + 250 mm coordinates.

Manufacturer's WorldSID design rib angle (around Y, in °) (not mandatory).

Do you expect the rear side airbag to be fired during the AE-MDB impact (Y/N)?

Are the rear seat side airbag(s) expected to deploy during the AE-MDB impact (Y/N)? If so, detail which test and which side of the vehicle?

In the event that the SAME vehicle is used for both VRU and AE-MDB impact tests, ensure that additional parts (e.g. A-pillar trim) will be provided and delivered to the laboratory on time to enable the change of parts if damaged during pedestrian tests (e.g. during the windscreen replacement). The OEM must ensure that the windscreen delivered for VRU tests (to replace broken ones) is equipped with the same features as the original one (e.g., ADAS systems such as camera).

Please check that the windscreen delivered for VRU tests to replace the broken one is equipped with the same features as the original one, e.g. ADAS system such as camera.

Pole Impact

As Front, & in addition:

Provide WorldSID design rib angle around Y, in degrees° (not mandatory).

Is the non-struck side curtain airbag expected to deploy during the pole impact test (Y/N)?

Provide details of the required inflation pressure to apply to the curtain airbag for evaluation of the HPD assessment zone.

Provie instructions to remove and replace interior trim (e.g., A-pillar) in the event that the SAME vehicle is used for VRU tests. In the event that the SAME vehicle is used for both VRU and Pole tests, please ensure that additional parts (e.g. A-pillar trims) will be provided and delivered to the laboratory on time to enable the change of parts if damaged during pedestrian tests (e.g. during the windscreen replacement). The OEM must ensure that the windscreen delivered for VRU tests (to replace the broken one) is equipped with the same features as the original one (e.g., ADAS systems such as camera).

3.6 Assessment procedure information

MPDB Frontal impact

Supply an OLC curve for the vehicle.

Front structure asymmetry

Please supply data regarding Euro NCAP equivalent tests on the opposite hand of drive to the one tested. A comparison should be presented between the vehicle tested by Euro NCAP and an opposite hand of drive vehicle and must include:

- Comparison of post impact photos
- Dummy measurements
- B-pillar pulses
- Static deformation measurements

Driver and Passenger Head Airbag – Dual Stage (if applicable)

Please explain the timing and charge used in the two stages, and also indicate at what time the second stage burn off occurs in lower severity impacts.

Dual seatbelt pretensioners.

Please indicate the firing order and times of dual pretensioners in all seating positions applicable.

Knee modifiers.

Knee mapping data.

3.7 Side and pole test

Far side test results and summary dossier. See Side Impact protocol for details.

3.8 Virtual test results

Far side robustness simulations.

Frontal impact sled and simulation data.

3.9 Rear impact

Provide the following seat information:

- Floor mounting pattern
- Seat rail angle
- Seat rail travel (especially if different on both sides)
- Fixation/support information
- 2D / 3D drawing of seat rails + mounting points
- Electric seat connector pin layout (if applicable)

Alternatively, the manufacturer may supply suitable seat mountings to the laboratory.

Provide the heel plane height Z coordinate.

Provide details of seat belt anchorage geometry/coordinates and triggering where required.

Provide anticipated seat settings e.g. seat back angle (e.g. 3 notches from forward) and reference point with respect to the seat reference point or head restraint tube angle.

Where active head restraints are equipped, triggering information shall be provided for all active aspects of the system (pre-tensioners, active HR, etc.)

Triggering system details, ALL relevant information (magnetic, electronic, required current/voltage, pulse duration etc.)

Provide the R50-point location relative to an identifiable location on the seat.

Provide the seat back design angle. The same torso angle for 50th percentile occupants must be the same as used in the full scale impact tests.

Fixed origin on seat runners
Identifiable points on the seat frame relative to origin
Identifiable points on HR relative to origin.
Other identifiable locations where necessary

Rear seat H-point information including design torso angle, relevant coordinates and information to determine if outboard seating positions are symmetrical.

Head restraint system (type)

If the vehicle has an active or reactive head restraint system, details on how the system is to be triggered along with relevant deployment timings shall be provided to the Secretariat before testing. Convincing justification for the deployment times in the Euro NCAP pulses shall be provided, such as response times from similar tests such as the RCAR bumper test and AZT test.

Passenger seat - Worst case geometry

The passenger seat may have different positions to those of the driver seat, for example due to lack of height adjustment. Therefore, the HRMD measurements could differ between seats. In order for any credit to be given for the passenger seat, further information is required regarding the specification of the passenger seats.

Please provide three measurements from each of three separate passenger seats.

Rear seat - Eligibility

Confirmation that the vehicle is equipped with centre rear head restraints as standard is required and that they are in accordance with UN regulation No. 17-08.

4 CHILD OCCUPANT PROTECTION

4.1 Preconditions

Please provide the relevant UN Regulation No. 129 approval certificates for the child restraints.

If the vehicle has universal ISOFIX approval, please provide the UN Regulation No. 14 certificate (including the test report showing anchorage pull tests) and the UN Regulation No. 16 certificate.

If the recommended CRS-Vehicle interface is semi-universal/vehicle specific, please provide certificates demonstrating appropriate approval and evidence that the vehicle is on the approved list of the CRS manufacturer.

If the vehicle has i-Size approval, please provide the relevant UN Regulation No. R145 approval certificates and test report.

Manufacturer nominated CRS not on CP 008 must either be evaluated by the ETC test programme or show similar performance in an alternative programme/tests.

ISOFIX anchorage integrity test data as detailed in CP 008.

A completed website information form CP 008 must be provided.

4.2 ISOFIX size assessment

Provide information regarding the ability of the vehicle to accommodate the largest size of ISOFIX restraint. Photos of the R3 sized gabarit installed in the vehicle and details of the position of the front seat are required. The photos should show the space (if any exists) between the rear of the front seat back and the front of the R3 sized gabarit.

The requirements for the front seat position are as follows:

a. Seat positioned midway between fully forwards and fully rearwards.
b. Seat back angle may be adjusted to a max torso angle of 15°.

4.3 Child Presence Detection

Is the vehicle equipped with a CPD system as standard? If so, detail if this is direct or indirect sensing.

Is the system able to categorise occupants? I.e. distinguish between a new born and an adult?

Provide details of the Scenarios that are covered by the CPD system e.g:

Scenario 1 & 2
Scenario 1, 2 & 3

What occupant space does the system cover?

Rear seats only
Front and rear seats and ALL occupant space

Provide details of the system functionality.

Initial warning only
Initial warning and Escalation warning
Initial warning, Escalation warning and Intervention

Where a system is equipped with intervention, provide details of the following:

- Triggering parameters
- Can the triggers be simulated by the laboratory
- Duration of intervention

Provide any extracts from the vehicle handbook needed for CPD assessment, such as:

- CPD system functionality
- CPD system connection with mobile devices

Where any alerts are made through the mobile phone, please be ready to share the mobile phone with the app installed for the assessment.

Is it necessary to drive the vehicle in order to trigger CPD, or can it be checked stationary in a garage?

Does the CPD system need to have all the different CRS and child dummies installed in the car in order to be triggered?

Does the CPD system need to have one of the different CRS and its child dummy installed in the car in order to be triggered?

Where applicable, provide instructions on the following system aspects:

- How to deactivate CPD for short term (for the current trip only).
- How to deactivate CPD for long term (not only for the current trip).
- Where in the vehicle the telltale informing the CPD is OFF is located.
- How to delay the initial warning.
- How to cancel the initial warning.
- How to cancel the escalation warning.
- How to lock the vehicle and activate the CPD system (car key, car card, mobile phone).

5 PEDESTRIAN PROTECTION

5.1 Predicted data

Manufacturer grid marking coordinates relative to an identifiable location on the vehicle.
Predicted colour or HIC data clearly identifying defaulted points and blue points.
Justification for all blue points.
In case there are two blue zones next to each other, details of which point(s) form a blue zone.
Manufacturer grid marking coordinates relative to an identifiable location on the vehicle.
Number of Manufacturer funded verification headform tests max (10).
Number of Manufacturer funded blue point tests max (8).

Details of asymmetrical legform and upper legform locations before testing begins.

Manufacturer funded upper legform and legform tests.

5.2 Active pedestrian protection system data

General system description shall be provided which details the type of sensor system (pressure/acceleration etc) and give details of any airbags, actuators and hinge mechanisms.

Active operating range for the system (km/h).

Human body certification results according to CP 540.

Human body model simulations for head impact time (HIT) of relevant pedestrian statures (6YO, 5th female, 50th male, 95th male).

System total response time (TRT) compared to HIT.

Confirmation of hardest to detect impactor (HTD).

Data from all necessary physical tests, the number of which will be dependent upon the sensing system. This shall also include details of the test to be witnessed by Euro NCAP.

HIC data for an undeployed system at the lower operating limit.

Bonnet deflection analysis.

APPENDIX A OEM VEHICLE QUESTIONNAIRE

The following information shall be completed by OEM prior to any testing and sent directly to the test laboratory.

Manufacturer Specified Information – General Information	
Information	**OEM Response**
Name of the car	
Vehicle type (PHEV, HEV, EV, H2EV/ FCEV, etc)	
1. SD Switch position. Is it mechanical or is it an electric device? If there is no SD switch please provide instructions on a physical way to deactivate the HV system (emergency button).	
2. Technical documents about how to deactivate HV system to work safely. Procedure?	
3. Technical documents about how to remove HV battery to work safely Post test. Procedure?	
4. Vehicle specific tool (lid, pad lock or other), in case there is one, to block the access to the SD switch area once it is unplugged and/or prevent the high voltage system reconnection.	
5. In case of post-test absence of HV not complying, OEM to explain how HV system can be deactivated without contact to, or manipulation of, the vehicle. e.g. if necessary by installation pre-test of external emergency switch to service disconnect.	
6. OEM to provide diagram or pictures of the points where Test Facility must measure the voltage of the powertrain buses after the disconnection relay. If disconnection relay is external to HV battery, diagram to include measurements to that location.	

Manufacturer Specified Information – General Information	
Information	**OEM Response**
7. OEM to declare connector type / requirement to the external HV vehicle break-out box. OEM to provide all relevant information.	
8. OEM to explain the powertrain bus type / condition and limit values for isolation resistance measurement (separated or combined AC or DC buses, or confirmation of IPXXB is fulfilled).	
9. OEM to provide document and pictures of safe handling of HV battery, in case of direct contact and / or removal of the HV battery.	
10. Nominal voltage requirement of the HV battery for normal vehicle operation	
11. Minimum state of charge (SoC) of the HV battery to allow electric drive to perform the crash	
12. OEM to provide details of electrolyte (colour, smell etc)	
13. OEM to provide details of how to pre-test operate the vehicle with the HV disconnected, and identify care points to prevent damage and errors to the vehicle ECUs.	
14. OEM to provide details of restrictions to pre-test / post-test movement of the vehicle, without damaging the regenerating system.	
15. OEM to declare risk of regenerating energy during vehicle movement.	
16. OEM to supply and demonstrate values of condenser X and Y.	
Additional item for BEV / PHEV:	

Manufacturer Specified Information – General Information	
Information	**OEM Response**
17. OEM to provide battery charger and declare recharge method for BEV and PHEV.	
Additional items for HEV:	
18. OEM to provide information how to attain electric drive.	
19. OEM to explain how the electric drive can be maintained without combustion engine operation. e.g. disabling of combustion engine mode.	
20. OEM to explain how to charge the HV battery without moving or driving the vehicle.	
Additional items for FCEV:	
21. Helium is recommended to be used for test. OEM to provide details of limitations to use helium as substitute to hydrogen.	
22. OEM to provide information of minimum hydrogen tank pressure to allow electric drive.	
23. OEM to provide details of how the Test Facility can install sensors to monitor and record the tank pressure and temperature.	
24. OEM to support with supervision and guidance on the installation of the sensors, within 1 week prior to day of test.	

Definitions of terms used in questionnaire:

- **HV:** "*High Voltage"* is considered at the automotive industry circuits with more than 60 Volts.
- **BEV:** "Battery *Electric Vehicle",* a vehicle driven only by one or more electric motors. The EV also contains a high voltage battery and the battery has external charging.
- **PHEV:** "*Plug-in Hybrid Electric Vehicle"*, it is a vehicle driven by an internal combustion engine and one or several electric motors, at the same time or independently. The vehicle also contains a high voltage battery and the battery has external charging.
- **HEV:** "*Hybrid Electric Vehicle"*, it is a vehicle driven by an internal combustion engine and one or several electric motors, at the same time or independently. The vehicle also contains a high voltage battery but the battery cannot be charged with external charger.
- **FCEV:** "*Fuel Cell Electric Vehicle*", is an electric vehicle that uses a fuel cell, sometimes in combination with a small battery or supercapacitor, to power its onboard electric motor. Fuel cells in vehicles generate electricity generally using oxygen from the air and compressed hydrogen.
- **SD Switch:** "Service Disconnect Switch", mechanical or electric device that is used to disconnect the HV battery avoiding the output of power to the powertrain or additional circuits.