EURO NCAP

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Rear Impact
H-point Measurement

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 H-POINT MEASUREMENT

This document details the procedure to be followed when measuring the H-point for Rear Impact testing.

1.1 H-point manikin installation

1.1.1 The seat shall be covered with a cotton cloth large enough to cover both cushions and seatback.
1.1.2 The cloth shall be tucked into the seat joint by an amount sufficient to prevent hammocking of the material.
1.1.3 The H-point manikin shall be installed in the seat.
1.1.4 The lower legs shall be adjusted to the 50th percentile leg length setting, and the upper legs shall be adjusted to the 10th percentile leg length setting; these are the HPM settings closest to the Euro NCAP front and side impact protocol settings.
1.1.5 The legs shall be attached to the HPM and set to the 5th position (no.5) on the knee joint T-bar, which places the knees 250mm apart.
1.1.6 With the legs attached and the back pan tilted forward, the HPM shall be positioned in the seat such that its mid-sagittal plane coincides with the longitudinal centreline of the seat. The centreline of the seat may be defined from features such as the head restraint support tubes or seatback and seat pan side bolsters. Particular attention should be paid to seats with asymmetric design.
1.1.7 The back pan shall be straightened to conform to the vehicle seat back.
1.1.8 The feet shall be placed as far forward as possible, with the heels resting on the heel plane and the feet positioned at 90° to the tibias. The toe pan shall be positioned sufficiently far away so as to avoid any interaction with the feet during the HPM installation process.
1.1.9 The lower leg and thigh weights shall be attached to the HPM and the assembly shall be levelled.
1.1.10 The back pan shall be tilted forward to 45° from the seat back and the HPM assembly pushed rearward until the seat pan contacts the vehicle seat back. While maintaining the back pan at 45° to the seat back, a horizontal rearward force of 100N shall be applied using the plunger if present or using a force gauge pressed against the hip angle quadrant structure.
1.1.11 The load application shall be repeated and, while keeping the 100N applied, the back pan shall be returned to the vehicle seat back and the load then released. As the 100N is released, a small force should be maintained on the front of the T-bar to prevent any longitudinal movement. This support should be maintained until the end of Section 1.1.16 is reached.
1.1.12 A check shall be made to determine that the HPM is level, facing directly forward, and located in the centreline of the seat.
1.1.13 After estimating the vehicle seat back position, the right and left buttock weights shall be installed. The eight chest weights shall be installed by alternating left to right. Throughout the weight installation, maintain a light pressure to the T-bar preventing any longitudinal movement.
1.1.14 Where no OEM information has been provided regarding seat back angle, the HPM torso angle shall be measured by placing an inclinometer on the calibrated back angle surface of the H-point machine.
1.1.15 Tilting the back pan forward to a vertical position, the assembly shall be rocked from side to side over a 10° arc, 5° in each direction. Where seat side bolsters prevent movement of up to 5°, the assembly should be rocked as far as permissible. This rocking shall be repeated twice, making a total of three complete cycles. Care should be taken to maintain

support of the T-bar during the rocking action, and to ensure that no inadvertent exterior loads are applied. Ensure that the movements of the HPM feet not restricted during this step. If the feet change position, they should be allowed to remain in that attitude for the time being.

1.1.16 Holding the T-bar to prevent the HPM from sliding forward on the seat cushion, the back pan shall be returned to the vehicle seat back, and the HPM shall be levelled.

1.1.17 To ensure a stable torso position, apply and release a horizontal rearward load, not to exceed 10N, to the back pan moulding at a height approximately at the centre of the torso weights. Care shall be exercised to ensure that no exterior downward or lateral loads are applied to the HPM.

1.1.18 Each foot shall be alternately lifted off the floor via the instep until no additional forward foot movement is available.

1.1.19 The 45 degree plane of the toe board should be moved toward the feet such that the tip of the toe lies between the 230mm and 270mm lines taking care not to disturb the position of the HPM. To facilitate easier setting of BioRID, the toe board should be moved such that the toes of the HPM feet are positioned nearer to the 230mm line.

1.1.20 When each foot is in its final position, the heel shall be in contact with the floor, and the sole of the foot shall be in contact with the 45 degree plane of the toe pan between the 230mm and 270mm lines.

1.1.21 If the HPM is not level after the feet have been repositioned, a sufficient load shall be applied to the top of the seat pan to level it on the vehicle seat. This may be verified using the bubble gauge fitted to the manikin or alternatively by verifying with CMM that the H-point positions on both sides of the machine are within ± 2.5mm of each other.

1.1.22 Set the seat back angle to the manufacturers design position (±1°) for a 50th percentile male. If no design position is provided, set the seat to a torso angle of 25°±1°. Check that the actual torso angle is coincident (±1º) to the manufacturer's torso design specification.

1.1.23 If the actual torso angle is outside of this tolerance, remove the manikin and make the minimal adjustments to the lower seatback angle.

1.1.24 Reinstall the manikin from Section 1.1.3 onwards and check that it is coincident with the manufacturer's torso design specification (±1º). For example, if the torso design angle is 23.0° and the measured torso angle is 24.1°, adjust the angle until a measurement of 24.0° is achieved. This may be done with the use of identifiable hard points on the seat frame.

1.1.25 Where no design position is provided, set the lower seatback angle to read an actual torso angle of 25º±1º. Record the final torso angle value.

1.1.26 For torso design angles below 20°, testing shall be carried out at 20°. For torso design angles above 30°, testing shall be carried out at 30°.

1.1.27 For seats with indexed recliner adjustments, use the closest locking position to the target torso design angle between 20°-30°. This may require measurements in two different inclinations.

1.2 Record the location of the HPM H-Point Markers

1.2.1 Record the H-point positions on both sides of the HPM using a CMM or other means to record the location of both H-points relative to the seat or sled.

1.2.2 The H-point position on both sides of the machine shall be within ± 2.5mm of each other in X and Z. If this is not the case, the installation procedure from 1.1.6 shall be repeated.

1.2.3 Check that the measured H-point corresponds to the R50-point specified by the Vehicle manufacturer (±10mm). Where no R50-point specification has been provided, record the position.

1.3 Repeat measurements

1.3.1 Section 1.3 is only applicable if either no design position for the seat back or R50-point has been provided by the manufacturer, or if the checks described in sections 1.1.22 or 1.2.3 result in values outside of the specified tolerances.

1.3.2 Remove the H-Point Machine and repeat Sections 1.1 to 1.2.3 two further times and record ALL measurements taken for each installation. For the repeat installations, the seat back angle should not be adjusted. However, where a change in seat back angle is required to obtain the required torso angle, the installation procedure shall be repeated until three consecutive installations have been performed which require no seat back angle adjustment.

1.3.3 For each individual seat, ensure that the H-point X and H-point Z are within a box of 5mm between the three sets of measurements. Outlying measurements should be investigated and repeated to achieve consistent static measurement results as necessary.

1.3.4 Once each individual seat has been measured three times, calculate the average H-Point position and average actual torso angle. These should be within the tolerances specified in sections 1.1.22 for the actual torso angle and 1.2.3 for the H-Point. If the H-point is still not within tolerance, then the average measured H-point position shall be used.