SAE 826 3D H-Point Manikin

Use in Defining and Measuring Vehicle Seating Accommodation

HRMD Head Restraint Measuring Device

Design and Test Vehicle Seat Head Rests that are effective in preventing some whiplash injuries.

Euro NCAP Gloria Procedure for Manikin and HRMD

Used for the measurement of Head Restraint Geometry
Automotive Accessories Limited UK, manufacturer the "3D H-Point Manikin Machine", also called the Manikin.

The 3 dimensional Manikin is used as an aid in the design and development of seats and to check prototype and production vehicle seating compartments, to design specifications.

The Automotive Accessories Manikin is used world-wide by vehicle seat manufacturers and even automobile manufacturers.

The SAE and ECE Standards have been prepared to provide a universal three dimensional manikin for use in defining vehicle seating accommodation.

The H-point manikin represents the weight and contour of a 50\textsuperscript{th} percentile adult male and the contour of a 10\textsuperscript{th} and 95\textsuperscript{th} percentile adult male.

Constructed of reinforced plastic and metal, it consists of a separate back pan and seat pan, mechanically hinged at the hip or "H." point, which simulates the actual pivot centre of the human torso and thigh.

A graduated sliding probe is hinged from the "H" point, to measure the effective headroom in the compartment.

A thigh bar attached to the seat pan establishes the thigh length and serves as a base line for the hip angle quadrant.

Lower leg segments also adjustable in length are connected to the seat pan assembly at the knee joint T bar, which is a lateral extension of the adjustable thigh bar.

Quadrants are incorporated in the lower leg segments to measure the knee angles.
Pivoted at the lower end of the lower leg segments, shoe and foot assemblies are calibrated to measure the angular relation.

A quadrant is fastened to the probe to measure the back angle.

Positive stops are provided in the thigh and lower leg segments for the 10\textsuperscript{th}, 50\textsuperscript{th} & 95\textsuperscript{th} adult male percentiles.

Two spirit levels orientate the device in space.

Body segment weights are placed at the proper centre of gravity locations to bring the manikin’s weight to 76 Kg, the 50\textsuperscript{th} percentile adult male weight.

Requirements for Manikin in European legislation
The manikin manufactured by Automotive Accessories Ltd. conforms to the following standards, ISO 6549-1999, E/ECE/324, E/ECE/TRANS/505, regulation No. 14, REV. 1/ADD. 13/REF, 1, ANNEX 4, as required for use with the EEC Directives listed below

<table>
<thead>
<tr>
<th>EEC Directive</th>
<th>EEC Regulation</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>76/115-82/318</td>
<td>14</td>
<td>Belt Anchorage</td>
</tr>
<tr>
<td>74/60-78/632</td>
<td>21</td>
<td>Interior Fitting</td>
</tr>
<tr>
<td>71/127-79/795</td>
<td></td>
<td>Rear Visibility</td>
</tr>
<tr>
<td>77/649-81/643</td>
<td></td>
<td>Forward Visibility</td>
</tr>
<tr>
<td>78/317</td>
<td></td>
<td>Demist-Defrost</td>
</tr>
<tr>
<td>78/318</td>
<td></td>
<td>Wiper Washer System</td>
</tr>
<tr>
<td>74/408-81/577</td>
<td>17</td>
<td>Seat Anchorage</td>
</tr>
<tr>
<td>78/932</td>
<td>25</td>
<td>Head Restraint</td>
</tr>
</tbody>
</table>

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3D H-Point Manikin

- Head Probe
- Back Angle Quadrant
- Thigh Weights
- Knee Quadrant
- Leg Weights
- Ankle Quadrant
- Torso Weights on Torso Weight Hangers
- Back Pan
- Seat Pan
- Buttock Weights

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3D H-Point Manikin

- Head Room Probe
- Torso Weight Hanger
- H-Point Pivot
- Hip Angle Quadrant
- H-Point Sight Button
- Knee Angle Quadrant

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HEAD RESTRAINT MEASURING DEVICE (H.R.M.D.)

Automotive Accessories Limited UK is the main supplier for the H.R.M.D. Soft tissue neck injury is the most frequent type of injury sustained in motor vehicle crashes.

Many of these injuries and mitigation can be prevented by effectively positioning the head restraint.

To be effective the head restraint must be both of adequate height and close enough to the back of the occupant's head.

Many head restraint designs, especially adjustable restraints, fail in one or both of these requirements.

The Head Restraint Measuring Device (HRMD) is designed to give accurate and repeatable measurements of head restraint position.

It attaches to the three dimensional H-point machine and provides 50th percentile male measurements for both height and setback of head restraints.

The H-point machine is installed in the vehicle according to normal procedures. The HRMD is then mounted on the H-point machine and the neck joint adjusted to level the head form.

The two probes are then used to measure head restraint height (to the top of the head form, or extrapolated to determine distance up from the H-point or the compressed seat cushion).

The second probe is used to measure the amount of setback between the head and head restraint.

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Adjustable Head Restraints

Introduction

- Correct vertical adjustment of head rests reduces the risk of soft tissue neck and back injury during a rear-end crash.
- Whiplash or soft-tissue injuries, defined as a sprain of the neck or back, account for approximately 70% of all injuries reported annually. These injuries cost each policy holder approximately $190.00 a year.
- ICBC surveys show that about 60% of vehicles on the road have improperly adjusted head rests.

Adjusting your head restraint

- Raise the head rest so the top is at least level with the top of the ears, higher is even better.
- Your head rest should be less than 10cm from the back of your head. Closer head restraints can be twice as effective in preventing injuries as those which are set too far back.
- Make the adjustment every time you ride in a vehicle that is equipped with adjustable head rest.
- In addition to sufficient head restraint height, the best protection is provided when the distance between the back of the head and the restraint is as small as possible. Consider this additional safety feature when purchasing your next vehicle.

Injury prevention

When a vehicle is struck from behind, the vehicle is accelerated forward and the raised head restraint stops the head and neck from extending backwards on impact, reducing the risk of soft tissue injury.

Conducting head restraint research

- ICBC rates the features of head restraints in new vehicles. The results of this research is published in the booklet, Buying A Better Auto, which is available from ICBC Claim Centres.
- Current research indicates that 28% of soft tissue injuries can be avoided by proper head rest adjustment.

Fixed or “built-in” head restraints

A “built-in” head restraint is actually the upper part of the vehicle seat back and is not adjustable. If the seat back is at least level with the top of the ears, or higher, the back of your head and neck will be supported in case your vehicle is rear-ended.
How they rate

A head restraint is rated on the following scale:

<table>
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<tr>
<th>1994–2002 Model year</th>
<th>2001 Model year</th>
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<tbody>
<tr>
<td><strong>Good:</strong> the head restraint is not more than 12 cm down from the top of the head, and not more than 10 cm back from the back of the head.</td>
<td><strong>Good:</strong> the head restraint is not more than 7 cm from the back of the head, and not more than 6 cm down from the top of the head.</td>
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<tr>
<td><strong>Fair:</strong> if either of these measurements are exceeded, but within 15 cm down from the top of the head and within 12 cm back.</td>
<td><strong>Acceptable:</strong> is 7 to 9 cm from the back of the head and/or 6 to 8 cm down from the top of the head.</td>
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<tr>
<td><strong>Poor:</strong> head restraints exceed either of the “fair” measurements.</td>
<td><strong>Marginal:</strong> the head restraint is 9 to 11 cm from the back of the head and/or 8 to 10 cm down from the top of the head.</td>
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<td><strong>Poor:</strong> head restraints exceed one or both of the “marginal” measurements.</td>
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(Note: These scales are based on head restraint adjustment for an average size male occupant. Your own fit may be better or worst depending on your size and driving posture.)

This publication reflects the laws in British Columbia as of October 2002. You should be aware that laws might change from time to time, so for a current statement of the law, you should refer to the applicable legislation. In the case of any conflict between this publication and the legislation, you should always follow the legislation.

For more information on vehicle safety, check out Transport Canada’s website at [www.tc.gc.ca](http://www.tc.gc.ca) or our website at [www.icbc.com](http://www.icbc.com)