



**Australian Government**  
**Department of Transport and  
Regional Services**

Issued by the  
**Administrator of Vehicle Standards**  
in consultation with the  
**Australian Motor Vehicle Certification  
Board**  
comprising Commonwealth, State and Territory representatives

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NATIONAL CODE OF PRACTICE

**STANDARDS BULLETIN VSB 5A**

**COMMERCIAL MANUFACTURE AND  
INSTALLATION OF ADDITIONAL SEATS**

Issue 2.0 - Revision 1.0

Supersedes document dated December 1996

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This Code does not cover administrative requirements imposed by State,  
Territory and Federal jurisdictions

This Code of Practice is intended as a guide for manufacturers  
and installers of additional seats

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## **SCOPE**

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This Code of Practice provides information for vehicle manufacturers, vehicle modifiers, seat manufacturers and seat suppliers to assist them in ensuring that the additional seats constructed, supplied and/or installed by them comply with an acceptable level of occupant protection.

## **INTRODUCTION**

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This Code of Practice is to be used for the manufacture and installation of additional seats in motor vehicles on a commercial basis.

Additional adult seats installed in new vehicles first offered for sale in Australia must comply with the Australian National Standards for new vehicles, known as the Australian Design Rules (ADRs). The ADR which specifically applies to seats is ADR 3/...

All other seats should comply with the latest edition of this Code of Practice.

For those people who may wish to construct a one-off additional seat and to install it in their own vehicle they should refer to the latest edition of Vehicle Standards Bulletin No. 5B (VSB 5B) *National Guidelines - Construction and Installation of Additional Seats by Individuals*.

## **CAUTION**

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Seats and seat belts play a critical role in occupant protection and personal comfort. The seat and seat belt can be subjected to substantial forces in a crash so they must be carefully designed, constructed and installed to ensure that they provide adequate protection.

Passenger vehicles generally provide a higher level of safety than goods carrying vehicles.

Where additional seats fitted to a new vehicle result in a change of vehicle category from a goods carrying vehicle (Category N series) to a passenger carrying vehicle (Category MA, MB and MC) the modified vehicle must be certified as a vehicle which has undergone a second stage of manufacture and be affixed with a second stage of manufacture plate.

If a goods carrying vehicle which has already been registered and used is converted to a passenger carrying vehicle by the fitting of additional seats engineering evidence must be provided that the vehicle meets those higher safety standards.

A goods carrying vehicle becomes a passenger carrying vehicle when the total number of seating positions multiplied by 68 kgs is 50 per cent or more of the vehicle's load carrying capacity.

## **APPLICABILITY**

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This Code of Practice is applicable to additional seats for cars, station wagons, vans, utilities, campervans, small buses and light trucks.

The ADR Vehicle Categories for these vehicles are:

MA - passenger cars;

MB - forward control passenger vehicles;

MC - off-road passenger vehicles;

MD - light omnibus;

NA - light goods vehicles; and

NB 1 - medium goods vehicles up to 4.5 tonnes Gross Vehicle Mass (GVM).

## **GENERAL**

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For the purpose of this Code of Practice, additional seats are divided into three categories to allow seats to be designed for occupants of different size and mass. The seat categories are:

Category 1 - Seats intended for use by adults;

Category 2 - Seats restricted to use by children up to 12 years of age; and

Category 3 - Seats restricted to use by children up to 8 years of age.

Category 2 seats may only be installed when the seat manufacturer or installer can demonstrate that the head space and leg space available are only sufficient to accommodate a child up to a 50 percentile 12 year old male child.

Category 3 seats may only be installed when the seat manufacturer or installer can demonstrate that the head space and leg space available are only sufficient to accommodate a child up to a 50 percentile 8 year old male child.

This is aimed at ensuring that the possibility of a seat being occupied by a person larger or heavier than the seat is designed to accommodate is reduced to a minimum.

Although this Code of Practice uses a template to determine head and leg space and for positioning the torso reference line to enable head restraint position and size to be determined; head space, leg space and head restraint position and size data obtained by using an H-Point Machine, as defined in SAE J826 November 1962 or SAE J826 APR 80, will be accepted.

## **SUBMISSION OF EVIDENCE**

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Where a State or Territory Registering Authority requires evidence to demonstrate that an additional seat installation complies with the requirements of this Code of Practice, the evidence must be submitted in the form of engineering calculations or test results certified by an engineer with experience in structural design, or as otherwise required by the registering authority.

## **SEAT LOCATION REQUIREMENTS**

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Careful consideration should be given to the suitability of the vehicle before additional seat(s) are installed. Aspects that must be considered when assessing the suitability of a vehicle for the installation of additional seats are:

- the space available in the vehicle must be sufficient to accommodate the additional seats and occupants
  - specifications regarding the space required for additional seats and occupants are set out in Figure 1;
- additional seats should not be installed in the trays of utilities or trucks unless adequate roll-over protection is provided
  - fibreglass, plastic and light steel canopies do not provide adequate roll-over protection;
- additional seats should not be installed in the vehicle in a location where there is a high probability that occupants will be injured in a crash
  - for example there is a high probability that an occupant in a rear facing seat in the rear of a small station wagon would suffer leg injuries in a rear end collision, because the occupant's legs are located in an area that will crumple as a result of the impact forces;
- additional seats must not impose any loads on existing seats, unless it is demonstrated that the original seats can carry the additional loads;
- access to and from all seats should be sufficient to allow a person to enter and exit the vehicle, operate door latches, folding seat controls, etc without assistance;
- the installation of seats in a vehicle's load space is not acceptable where the only access can be obstructed by the load;
- where existing seats are modified to improve access, eg by installing a folding mechanism, the modifier must demonstrate that the modified seats continue to comply with the latest edition of ADR 3/ ... ;

- fittings, including seat backs, should be padded to prevent injury where they intrude into the head space shown in Figure 1 of this Code;
- an assessment of the effect of the additional seats, head restraints (if fitted), and occupants on rearward visibility should be made
  - additional rear vision mirrors may be required in cases where rearward vision is restricted.

## **SIDE-FACING SEATS**

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Although side-facing seats may be fitted, front-facing and rear-facing seats are preferred because they provide a higher level of safety.

## **CHILD RESTRAINT ANCHOR POINTS**

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Child restraint anchorages must comply with the requirements of the latest edition of ADR 34/....

Child restraint anchorages must be provided in accordance with the latest edition of ADR 34/.... where an additional seat equipped with an adult seat belt assembly has been fitted.

Child restraint anchorages must not be installed to permit restraining devices such as baby capsules and child seats to be used on rear-facing or side-facing seats.

## **RELOCATION OF SPARE WHEEL**

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Where additional seats are installed in the spare wheel well of the vehicle, provision should be made for relocating and securing the spare wheel.

If the spare wheel is relocated within the vehicle, the spare wheel mounting should be of sufficient strength to withstand a deceleration of 20 times the weight of the spare wheel and its mounting in the forward, rearward or sideways direction.

The spare wheel and its mounting must not cause a hazardous projection for the vehicle's occupants.

## **INTERFERENCE WITH EXISTING SAFETY EQUIPMENT**

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The additional seats, relocated spare wheel, etc, must not prevent or restrict the use of existing safety devices such as seat belts and child restraint anchorages, unless complying alternatives are provided.

Note:

Child restraint anchorages are designed to withstand only those loads imposed by correctly fitted child restraints.

## **LABELLING OF SEATS**

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A plate or label made of durable material must be fitted in a conspicuous place near the additional seat. The plate or label must be made of a material which is not easily removed or defaced in normal use. The plate or label must display the following:

### **All seats:**

The name of the manufacturer/installer; and the statement:

**"This seat has been manufactured and installed  
to comply with Code of Practice Ref No. VSB 5A"**

In cases where the manufacturer is not the installer of the seat, the necessary information may appear on more than one label.

For Category 2 and 3 seats the following warning labels must also be provided and must be affixed in a conspicuous place near the additional seat(s).

### **Category 2 seats:**

The following warning with letters not less than 5 mm high:

#### **WARNING**

**THIS SEAT MUST NOT BE USED BY A PERSON  
HEAVIER THAN 38 kg OR WITH A  
SEATED HEIGHT GREATER THAN 780 mm**

### Category 3 seats:

The following warning with letters not less than 5 mm, high:

#### **WARNING**

**THIS SEAT MUST NOT BE USED BY A PERSON  
HEAVIER THAN 26 kg OR WITH A  
SEATED HEIGHT GREATER THAN 700 mm**

Note:

The seated height is the vertical distance between a flat surface on which the person is seated and the top of the person's head.

### **SEAT CONSTRUCTION**

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Seat frames must be constructed so that there are no sharp edges or projections which can cause injury to occupants in an impact. Seat padding and upholstery must be securely attached to the seat frame to prevent movement during impact. Loose cushions must not be used.

### **PADDING REQUIREMENTS**

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Additional front-facing or side-facing seats must be covered with at least a 25 mm thickness of padding material within the '*Head Contact Area*'.

For front-facing seats:

The '*Head Contact Area*' is defined as that area forward of the seating reference point contained within a vertical longitudinal plane at each end of the additional seat(s) cushion, a horizontal plane through the seating reference point and an arc of radius R from the seating reference point, where R is 835 mm for Category 1 seats, 715 mm for Category 2 seats and 625 mm for Category 3 seats.

For side-facing seats:

The '*Head Contact Area*' is defined as that area towards the front of the vehicle from the centreline of the additional seating position(s) contained within a vertical longitudinal plane through the rearmost point (relative to the direction in which the seat is facing) of the seat back, a vertical longitudinal plane at the foremost point (relative to the direction in which the seat is facing) of the seat cushion, a horizontal plane through the seating reference point and an arc of radius R towards the front of the vehicle from the seating reference point at the centreline of each additional seating position, where R is 835 mm for Category 1 seats, 715 mm for Category 2 seats and 625 mm for Category 3 seats.



## **PADDING MATERIAL**

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Where padding is required by this Code then the following padding materials, or their equivalent, are acceptable:

- semi-rigid moulded polyurethane with a density of approximately 300 kg/m<sup>3</sup>
- self-skinning rigid moulded polyurethane with a density of approximately 300 kg/m<sup>3</sup>
- closed-cell polyethylene foam with a density of approximately 300 kg/m<sup>3</sup>
- closed-cell EVA foam with a density of approximately 300 kg/m<sup>3</sup>

Foams typically used for upholstery work are not acceptable for occupant protection padding.

## **INSTALLATION KIT**

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Seats supplied by seat manufacturers or suppliers for installation by others must include an installation kit which must contain the following:

- Installation Instructions

Comprehensive and easily understood installation instructions which cover all of the makes and models of vehicles that the seat is intended to fit. The installation instructions must be such that when correctly followed, the seat installation will comply with all the requirements of this Code of Practice.

- Installation Hardware

Installation hardware such as bolts, nuts, lock washers, spacers and backing plates sufficient to allow the seat, seat belts, etc. to be installed correctly.

- Seat Label

The seat label or plate as required by the section [LABELLING OF SEATS](#).

## SPACE REQUIREMENTS

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### Head Space

No part of the vehicle body or component of the roof installation may project below the shaded zone shown in Figure 1.

The head space requirement must apply to each additional seating position.

The head space is to be determined using the template as shown in Figure 2. The template is to be positioned on the centreline of the seat with the point D located at the contact point of the template and the seat back. The centre of the radius A is to be located at the point C. Dimension A is shown in Figure 1 for the particular seat category.

The head space is limited by 45 degrees forward and 25 degrees rearward from the vertical, relative to the direction that the seat is facing.

If the seat back angle is adjustable, it is to be set at no more than 25 degrees rearward from the vertical, relative to the direction that the seat is facing. If the seat height is adjustable, it is to be set in the lowest position when the above measurement is taken.

### Leg Space

No part of the vehicle body, vehicle equipment or another seat may project into the shaded leg space shown in Figure 1.

The leg space must extend not less than 35 per cent of the seat width on either side of the centre line of each seating position.

The leg space is to be determined using the template as shown in Figure 2. The template is to be positioned on the centreline of the seat with the point D located at the contact point of the template and the seat back. The centre of the radius B is to be located at the point C. Dimension B is shown in Figure 1 for the particular seat category.

The leg room zone is limited by:

- a line 45 degrees above the horizontal and passing through the point C; and
- a line 15 degrees rearward of the vertical, (relative to the direction that the seat is facing), and tangential to the radius B and extending down to the floor.

If the seat back angle is adjustable, it is to be set at no more than 25 degrees rearward from the vertical, relative to the direction that the seat is facing.

If the seat's position is adjustable, it is to be set in the rearmost position, relative to the direction the seat is facing, when the measurement is taken.

## Seat Width

The minimum seat width per occupant for each category of seat must be:

Category 1 - 410 mm;

Category 2 - 300 mm;

Category 3 - 250 mm.

## **SEAT STRENGTH**

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### Front-facing Seats

Front-facing Category 1 seats and their anchorages must comply with the requirements of the latest edition of ADR 3/...

Front-facing Category 2 and 3 seats and their anchorages must comply with the requirements of the latest edition of ADR 3/... with the exception that the 530 Nm moment about the seating reference point for each seating position is reduced to:

Category 2 Seats - 300 Nm;

Category 3 Seats - 205 Nm.

### Rear-facing Seats

Rear-facing seats and their anchorages must comply with the requirements of the latest edition of ADR 3/....

In addition a rear-facing seat should withstand, without imposing any load on any other seat in the vehicle, a load equivalent to twenty times the weight of the seat and its occupant(s) applied in the forward direction relative to the vehicle.

Seats intended to accommodate more than one occupant should withstand the loads applied by all occupants simultaneously. This requirement should be demonstrated with the occupant test loads uniformly distributed over the backrest and head restraint of the seat.

The occupant mass to be used to determine the test loads must be:

Category 1 Seats - 68 kgs;

Category 2 Seats - 38 kgs;

Category 3 Seats - 26 kgs.

## **SEAT BELTS**

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Seat belts must be fitted to all additional seating positions to restrain the occupants under impact conditions.

All outboard seating positions must be fitted with lap sash or harness seat belts except where there is no permanent structure for mounting the upper sash or anchorages point, as set out in the latest edition of ADR 5/..., in which case lap belts must be fitted.

All inboard seating positions must be fitted with either a lap belt or a harness belt.

All side-facing seats must be fitted with lap belts only.

Seat belts must comply with the latest edition of ADR 4/....

## **SEAT BELT ANCHORAGES**

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Seat belt anchorages must comply with the latest edition of ADR 5/--- with the exception that the anchorage test loads for Category 2 and 3 seats are reduced to:

Category 2 seats - 50 percent of test load nominated in the latest edition of ADR 5/...;

Category 3 seats - 35 percent of test load nominated in the latest edition of ADR 5/....

For testing seat belts, body blocks which are scaled adult body blocks using factors of 0.85 for Category 2 seats and 0.75 for Category 3 seats must be used.

## **HEAD RESTRAINTS**

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### **Rear-facing Seats**

All rear-facing seats must be fitted with head restraints which provide an impact surface which meets the dimensional requirements as shown in Figure 3 for the particular category of seat.

Head restraints on rear-facing seats may be provided with vertical and fore-and-aft adjustment, however, they should not be removable.

The testing of the strength of head restraints on rear-facing seats is included in the test to determine the strength of the seat. (Refer to the section on Seat Strength.)

### **Front-facing Seats**

The fitting of head restraints to front-facing seats is optional, however, it is recommended that head restraints be fitted as they reduce whiplash injuries in rear end collisions.

Head restraints, where fitted, on front-facing Category 1 seats must comply with the latest edition of ADR 22/..

Head restraints, where fitted, on front-facing Category 2 and 3 seats must meet the following requirements:

- head restraints may be provided with vertical and fore-and-aft adjustment and they may be removable without the use of tools;
- head restraints must provide an impact surface which meets the dimensional requirements as shown in Figure 3 for the particular category of seat;
- head restraints must be constructed and contoured to decelerate horizontal movements of the occupant's head without concentrations of load on it;
- all solid structural members of the head restraint must be padded with high density foam of sufficient thickness to prevent injury to the occupant's head. Refer to Padding Requirements for the specification of a suitable high density foam;

- the strength of the head restraints on Category 2 and 3 seats must be tested using the test requirements for head restraints as set out in the latest edition of ADR 22/... for static test conditions with the exception that the 370 Nm moment about the seating reference point for each seating position is reduced to:

Category 2 Seats - 210 Nm;

Category 3 Seats - 145 Nm;

- to establish the displaced torso reference line the moment about the seating reference point may be applied directly to the seat back frame, ie a 3-dimensional manikin does not have to be used;
- the maximum load of 890 N applied to the head form at a point 635 mm along the torso reference line from the seating reference point is:

Category 2 Seats - a maximum load of 590N applied to the head form at a point 535 mm along the torso reference line from the seating reference point;

Category 3 Seats - a maximum load of 470N applied to the head form at a point 460 mm along the torso reference line from the seating reference point;

- the displacement of the rearmost point of the head form perpendicularly rearward of the displaced torso reference line shall not be more than:

Category 2 Seats - 142 mm;

Category 3 Seats - 130 mm.

Note:

The seat reference point is to be determined using the template shown in Figure 2. The template is to be positioned on the centreline of the seat with the point D located at the contact point of the template and the seat back. The seating reference point is located at point C.

The above displacements allow for:

- i. the 36 mm difference in the 'H-point to back of body' location for a child torso reference line relative to an adult torso reference line;
- ii. a nominal compression of the seat back upholstery under a body form 'displaced torso reference line' test of 20 mm; and
- iii. displacements of the head form for Category 2 and Category 3 head restraints, relative to the 102 mm displacement of the head form for adult head restraints, of:

Category 2 seats - 86 mm;

Category 3 seats - 74 mm.

The nominal displaced torso reference line from which the head form displacement is measured is the torso reference line parallel to the uncompressed seat back cushion location when the specified moment about the seating reference point for the particular category of seat is applied to the seat back frame.

## **APPENDIX A - DEFINITION OF TERMS**

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### **Seat Reference Point**

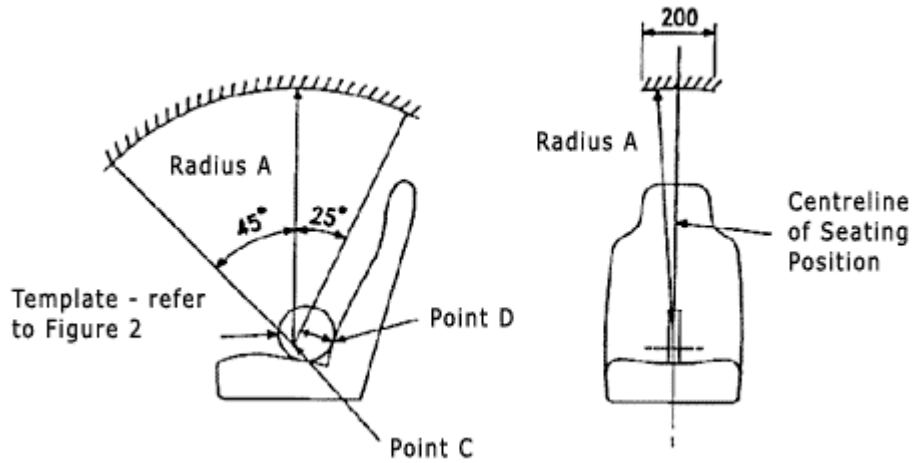
The seat reference point is to be determined using the template as shown in [Figure 2](#). The template is to be positioned on the centreline of the seat with the point D located at the contact point of the template and the seat back. The seating reference point is located at point C.

### **Torso Reference Line**

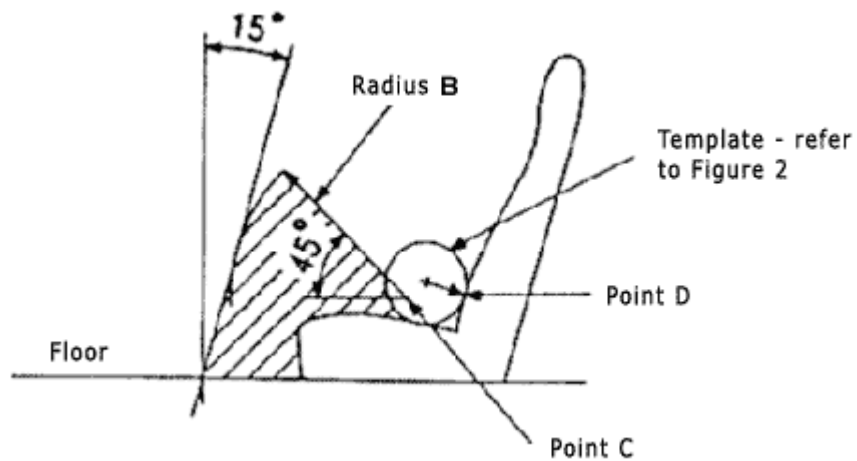
A line passing through the seat reference point and parallel to the seat back. For fully adjustable seat backs, it is a line passing through the Seat Reference Point and at a maximum angle of 30 degrees to the vertical.



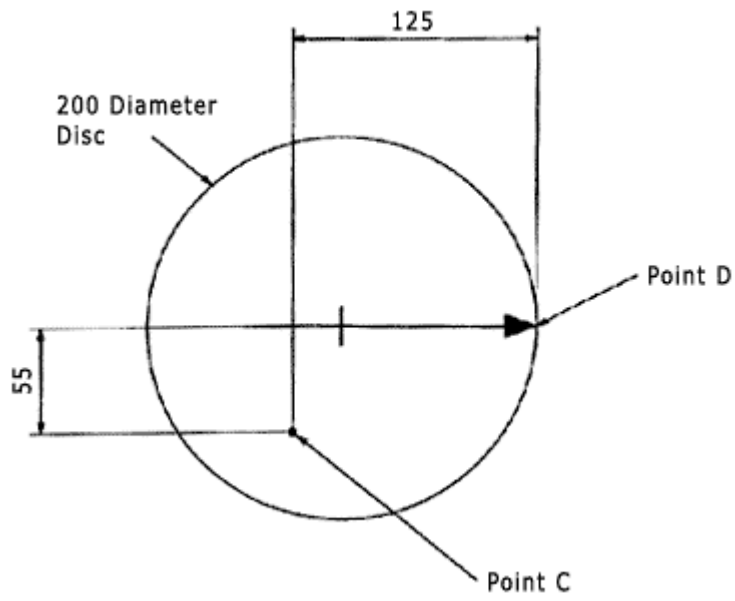
**FIGURE 1 - HEAD AND LEG SPACE**



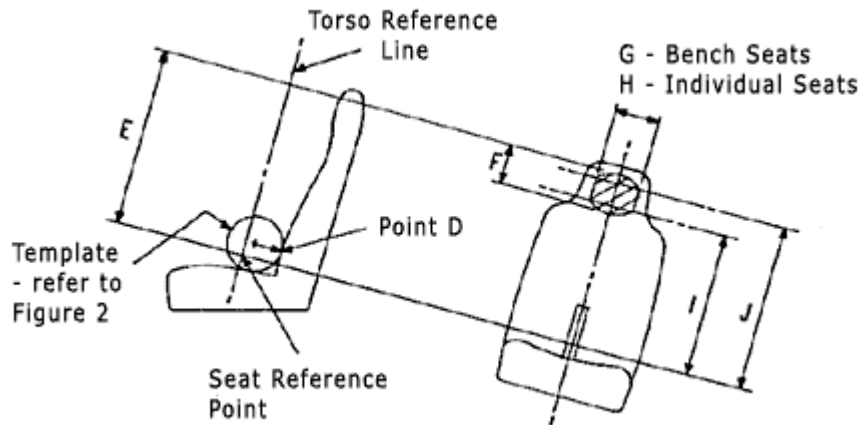
DIMENSION	CATEGORY OF SEAT		
	1	2	3
A	710 Min	710 Max 630 Min	630 Max
B	460 Min	370 Min	300 Min



**FIGURE 2 - TEMPLATE FOR DETERMINING HEAD AND LEG SPACE**



**FIGURE 3 - DIMENSIONS OF HEAD RESTRAINTS**



DIMENSION	CATEGORY OF SEAT		
	1*	2	3
E	700 Min	600 Min	525 Min
F	115 Min	115 Min	115 Min
G	250 Min	250 Min	250 Min
H	170 Min	170 Min	170 Min
I	585 Min	485 Min	410 Min
J	635 Min	535 Min	460 Min

**\* Applies to Rearward Facing Seats**

**SEAT REFERENCE POINT** - Point C on the template shown in Figure 2 with the template positioned on the centreline of the seat with point D located at the contact point of the template and the seat back.

**TORSO REFERENCE LINE** - A line passing through the Seat Reference Point and parallel to the seat back. For fully adjustable seat backs, a line passing through the Seat Reference Point and at a maximum angle of 30- degrees to the vertical.