NSW GOVERNMENT | Transport for NSW

Centre for Road Safety

Restraint Fitters Manual

Guidelines to the correct installation and use of child restraints

A fitter is engaging a seat belt buckle and tongue

Contents

Preface 02
Purpose 02
Scope 02
Document controls 02

1 General information 03
1.1 Glossary of child restraint terms 05
1.2 Basics of injury prevention and crash dynamics 07
1.2.1 Overview 07
1.2.2 Type of crashes 08
1.2.3 Newton's laws of motion 08
1.2.4 How child restraints prevent injury 10
1.2.5 Videos of crash testing 11
1.3 Types of child restraints 11
1.3.1 Overview 11
1.3.2 Rearward-facing child restraints (Types A1, A2 and A4) 11
1.3.3 Forward-facing child restraints 11
1.3.4 Convertible rearward/forward-facing child restraints (Type A/B) 12
1.3.5 Booster Seats 12
1.3.6 Convertible forward-facing/booster seats, Type B/E and Type B/F 14
1.3.7 Integrated booster cushions/seats 14
1.3.8 Dickey seats 14
1.3.9 ISOFIX compatible child restraints 15
1.3.10 Detailed description of child restraint types 18
1.4 Child Restraint Regulation 21
1.4.1 Summary of child restraint regulation 21
1.4.2 Approved child restraints 23
1.4.3 Penalties for not using approved child restraints 24
1.5 Best practices 24
1.5.1 General 24
1.5.2 When to move a child to the next type of child restraint 24
1.5.3 Seating Position 25
1.5.4 Airbags 25
1.5.5 Further information 25
Appendix 1 – Frequently asked questions by parents and carers 26

2 Installation and use of child restraints 33
2.1 Overview 35
2.2 Child restraint installation 35
2.2.1 Installing rearward-facing child restraints (Types A1, A2 and A4) 37
2.2.2 Installing forward-facing (Type B and G) restraints 37
2.2.3 Installing convertible child restraints: rearward/forward-facing (Type A/B) 37
2.2.4 Installing booster seats (Type E and Type F) weighing 2kg or less 38
2.2.5 Installing booster seats (Type E and F) weighing more than 2kg 38
2.2.6 Installing convertible restraints forward-facing/booster seats (Type B/E and B/F) 38
2.3 Installing ISOFIX compatible child restraints 39
2.3.1 Overview 39
2.3.2 In a car with ISOFIX mounting point 39
2.3.3 In a car without ISOFIX mounting point 40
2.4 Securing the child in the child restraint 40
2.4.1 Overview 40
2.4.2 Rearward and forward-facing child restraints 40
2.4.3 Booster seats (Type E and Type F) 40
2.5 Child restraint fitting accessories 40
2.5.1 Overview 40
2.5.2 Reasons why accessories should not be used 41
2.6 Installing old child restraints 42
2.7 Restraint care and maintenance 42
2.7.1 Overview 42
2.7.2 Cleaning the cover 42
2.7.3 Cleaning the harness buckle 42
2.7.4 Cleaning the straps/harness 42
2.8 Advice to parents and carers 43
2.8.1 Overview 43
2.8.2 Further information 44
Appendix 2 – Further information 44

3 Installation of child restraint anchorages 45
3.1 Scope 47
3.2 General requirements 47
3.2.1 Overview 47
3.2.2 Anchorage points without pre-installed anchorages 47
3.2.3 Australian Design Rules 48
3.2.4 Vehicle Standards Information 50
3.3 Installing child restraint anchorages to pre-ADR vehicles and those not required to have them 50
3.3.1 Overview 50
3.3.2 Rear parcel shelf mounted anchorage points 50
3.3.3 Child Restraint Anchorage Bar 52
3.3.4 Child restraint anchorage bar installation in panel vans and station wagons 54
3.3.5 Universal Frame 55
3.3.6 Techsafe post and Pedestal bar 55
3.3.7 Installing child restraint anchorages in dual cab utility vehicles 56
3.3.8 Installing child restraint anchorages in Toyota Commuter buses 58
3.4 Contact information for enquiries 59
3.5 Further Information 59
Appendix 3 – Installation instructions 59

4 Child restraints for children with special needs 65
4.1 Scope 67
4.2 Children with disabilities or medical conditions 67
4.3 Modifications to complying child restraints 69
4.4 Special purpose child restraints 69
4.5 Other information 73
4.5.1 More Information 73

Preface

This Restraint Fitters Manual (Manual) is intended to be used to assist restraint fitters authorised under the Roads and Maritime Services Authorised Restraint Fitting Station Scheme in the correct installation and use of child restraints.

This manual is developed by Transport for NSW in consultation with Crashlab, VicRoads and Neuroscience Research Australia (NeuRA).

This manual is presented in four modules:

1 General information

General information including glossary and terms used in the manual as well as regulations pertaining to child restraints.

2 Installation and use of child restraints

Information related to correct use and installation of child restraints in vehicles already equipped with child restraint anchorages.

3 Installation of child restraint anchorages

Information related to installation of child restraint anchorages and other vehicle modifications required to optimally securing children in motor vehicles.

4 Child restraints for children with special needs

Information related to safe restraint of children with additional needs.

This Manual was first published in 1997, and last updated 25 May 2016. It is a live document and subject to change in response to practical feedback.

Purpose

The purpose of the Manual is to provide Roads and Maritime Services authorised restraint fitters with the information for the correct use and installation of child restraints and associated equipment as part of NSW Government's commitment to reducing child fatalities and injuries on our roads due to the incorrect use of child restraints.

Scope

This Manual applies to all types of light vehicles, except motorcycles.

1

General information

04 A fitter is adjusting the 5 point harness

1 General information

1.1 Glossary of child restraint terms

2 for 3 seat: A double seat consisting of two adult seating positions that incorporates an additional centre seating position with a lap sash seat belt fitted within the two original seating positions and which has been shown to comply with the applicable vehicle standards in this configuration for occupation of each of the three seating positions by a child under 12.

Additional seat: Aftermarket extra seat installed in a non-passenger part of a vehicle, usually the cargo area of a station wagon or other vehicle. Also known as a 'Dickey' seat.

Airbag: A vehicle safety feature that consists of a flexible 'bag' which rapidly inflates with gas in a crash, in order to better control occupant motion and/or cushion the occupant from impact.

Appropriate restraint use: The use of a restraint that is optimal for the child's body measurements and development, and varies with age.

AS/NZS 1754: The mandatory Australian/New Zealand Standard Child Restraint Systems for Use in Motor Vehicles (AS/NZS 1754) that governs various requirements for the design, construction, performance, packaging, marking and user instructions of child restraints that are legal to be used in Australia.

Authorised Restraint Fitting Station: An RMS authorised establishment, such as a service station, garage, workshop, or other appropriate premises where motor vehicles safety restraint systems or components (including child restraints) are inspected, installed, modified and fitted in accordance with the 'Child Restraint Fitters Manual'.

Booster seat: A child restraint having a backrest, that raises the child and adapts the vehicle's seatbelt to better fit the child and is defined in the Australian Standard AS/NZS 1754 as either Type E or Type F restraint suitable for children from ages 4 to 8 (Type E) and 4-10 (Type F). It is also known as a 'belt positioning booster seat' or 'high back booster seat' overseas.

Booster cushion: A child restraint that raises the child and adapts the vehicle's seatbelt to better fit the child and does not have a backrest. It is also known as a 'low back booster seat'. This type of restraint has been removed from AS/NZS 1754:2010 and onward as they do not offer side impact protection.

Buckle cover: An aftermarket device designed to obstruct access to a seatbelt buckle or inbuilt harness buckle to discourage a child from unbuckling their restraint while travelling (see AS/NZS 8005:2013 for further information).

Inbuilt harness: A set of webbing straps built into the child restraint that are used to restrain a child.

Chest clip: Aftermarket device designed to keep the shoulder straps of a child restraint's inbuilt harness together to minimise the chance of these coming off the shoulder. It is also known as 'cross chest clips'.

Child restraint: A device used in a motor vehicle that restrains a child passenger to minimise the risk of injury in the event of a crash. This includes rearward-facing child restraints for infants, forward-facing child restraints for young children and booster seats for older children. It is also known as 'child safety seat', 'child car seat' and 'child safety system'.

Child restraint accessory: An add-on device used with a child restraint or seatbelt occupied by a child.

Child safety harness: An add-on harness that is designed to be used together with a compatible booster seat, lap-only seatbelt or converted lap-sash seatbelt to provide upper torso restraint. It is also known as an 'H-harness'.

Correct restraint use: The use of a restraint as instructed by the restraint manufacturer.

Converter: A device, other than a booster seat, for adapting an adult lap-sash seatbelt to better fit the child or provides additional upper body restraint. It is defined in the Australian Standard AS/NZS 1754 as a Type H.

Convertible restraint: A child restraint that can be used in more than one restraint mode, e.g. a restraint that can be used as either a rearward-facing child restraint or a forward-facing child restraint; or a restraint that can be used as either a forward facing child restraint or a booster seat.

Dickey seat: Aftermarket additional seat installed in a non-passenger part of a vehicle, usually the cargo area of a station wagon or other vehicle. It is also known as an 'additional seat'.

Five step test: A set of five assessment criteria designed to determine whether a child is big enough to get optimal fit in an adult seatbelt.

1 General information

Forward-facing child restraint: A child restraint with an inbuilt 6 point harness that restrains young children facing the front of the vehicle and is defined in the Australian Standard as Type B (for children from 6 months to 4 years) and Type G (for children from 6 months to 8 years).

Front passenger airbag: An airbag installed in front of the front passenger seat of a vehicle designed to protect the occupant in frontal crashes.

Harness slot: The slots in the back of a child restraint through which the inbuilt harness straps pass.

Inappropriate restraint use: The use of a restraint that is not optimal for the child's size and development, e.g. the use of a booster seat by a 2 year old would be inappropriate restraint use.

Incorrect restraint use: The use of a restraint in a manner other than that instructed by the restraint manufacturer. Also known as 'restraint misuse', and includes errors in installation of a restraint in a vehicle, and how a child is secured in the restraint, e.g. a child having the arms out of a harness, or failure to use a top tether strap.

Integrated child restraint: A child restraint, usually a booster seat, built into a vehicle by the vehicle manufacturer. It is also known as an 'integrated booster cushion'.

ISOFIX lower anchorages: A pair of horizontal bar fittings installed in a vehicle at the join between the seat cushion and the seat back. This is specifically designed for attachment of compatible child restraints that have ISOFIX anchorage connectors as an alternative to using a seatbelt when installing the restraint. It is also known as ISOFIX low anchorages or LATCH lower anchorages.

Lap only seatbelt: A seatbelt with only two points of attachment to the vehicle that restrains the pelvis of the occupant and does not restrain the wearer's upper torso. It is also known as 'two point belt'.

Lap sash seatbelt: A seatbelt with three points of attachment to the vehicle. The lap portion sits over the pelvis of the occupant and the sash belt restrains the upper torso. It is also known as 'lap-shoulder belt' or 'three point belt'.

Long distance coach: A bus designed for long trips and/or highway routes. This typically has individual seats, seatbelts in newer buses and nominated locations for the installation of child restraints.

Rearward-facing child restraint: An infant restraint with an inbuilt 5 or 6 point harness that restrains infants facing the rear of the vehicle. It is defined in the Australian Standard as Type A.

Road Rules: [NSW] Road Rules 2014.

Seatbelt: A device in a vehicle that restrains an occupant in a crash or sudden braking. Typically consists of webbing, and may be retractable or manually adjustable.

Seatbelt extender: An aftermarket device that provides additional length for a seatbelt. Typically used for large occupants, but can also be used to lengthen a seatbelt to facilitate installation of larger child restraints.

Seatbelt guide: A component of a booster seat designed to assist in positioning the seatbelt.

Seatbelt positioner: An aftermarket device designed to position an adult seatbelt to better fit a child.

Seatbelt tensioner: An aftermarket device designed to tighten the seatbelt when used with a child restraint.

Seating position: A dedicated location within a vehicle for a person to occupy.

Shoulder height markers: A set of labels on a child restraint that indicate the maximum and minimum shoulder height for a child using that restraint, or the height at which a child should transition from one restraint mode to another.

Side curtain airbag: An airbag installed in the side of a vehicle that deploys over the inside window region during a side impact crash.

Slack: Looseness in a child restraint's inbuilt harness, top tether strap, ISOFIX flexible straps or seatbelt that can reduce the performance of the restraint.

Submarining: A phenomenon which occurs during a vehicle crash where the vehicle occupant moves forward and the pelvis slides under the lap belt.

1 General information

Top tether: A flexible strap attached to the upper back of a child restraint, which connects to an anchorage point in a vehicle, and limits rotation of the restraint in a crash. Also known as an 'upper anchorage strap' or 'top tether strap'.

Torso airbag: A side airbag installed in either the seat or door of a vehicle that deploys to protect the chest in side impact crashes. Also known as a thorax airbag.

Type A restraint: Rearward-facing or transversely installed child restraint with inbuilt 5 or 6 point harness that restrains infants facing the rear of the vehicle. Type A restraint is divided into four types: Type A1, A2, A3 and A4.

- Type A1 restraints accommodate infant up to approximately 70cm tall or 6 months of age.
- Type A1/0 restraints are suitable for infants of low birth weight and up to approximately 70cm tall or 6 months of age.
- Type A2 accommodates infant up to 80cm tall or approximately 12 months of age.
- Type A2/0 restraints are suitable for infants of low birth weight and up to 80cm tall or approximately 12 months of age.
- Type A3 is a transversely installed restraint suitable for infant up to 6 months of age.
- Type A3/0 is a transversely installed restraints suitable for infants of low birth weight and up to 6 months of age.
- Type A4 accommodates children up to approximately 2-3 years.
- Type A4/0 restraints are suitable for infants of low birth weight and up to 2-3 years of age.

Type B restraint: Forward-facing child restraint with inbuilt 6 point harness that restrains children facing the front of the vehicle. Type B accommodates children from 6 months to 4 years of age.

Type C restraint: A forward-facing harness without a chair, also known as an add-on child safety harness or 'H-harness' that can be used to provide upper body restraint with lap-only seatbelts.

- Type C1 is designated for use with a compatible booster seat by children approximately 4-10 years of age.
- Type C2 is designated for use with a lap-only belt by children approximately 7-10 years of age.

Type D restraint: A rearward-facing child restraint with inbuilt harness designed to accommodate children to an older age (approximately 6 months to 4 years of age) than a Type A restraint.

Type E restraint: A booster seat that raises the child and adapts the vehicle's seatbelt to better fit the child. Type E restraint is intended for children approximately 4 to 8 years of age with a height of up to approximately 128cm.

Type F restraint: A booster seat that raises the child and adapts the vehicle's seatbelt to better fit the child. Typically has a taller seat back than Type E booster seats, allowing children to stay in the booster seat for longer. Type F restraint is intended for children approximately 4 to 10 years of age with a height of up to approximately 138cm.

Type G restraint: A larger, forward-facing restraint with an inbuilt 6 point harness included in AS/NZS 1754: 2013, for use up to older ages (approximately 8 years) than a Type B forward-facing restraint.

Type H restraint: A converter used with a booster seat suitable for children approximately 4-7 years of age and/or used with a seatbelt without a booster seat for children 7-10 years of age.

Urban bus: Public route bus used in urban areas. This typically does not have seatbelts or seating positions suitable for installing child restraints.

1.2 Basics of injury prevention and crash dynamics

1.2.1 Overview

The aim of this section is to provide restraint fitters with a brief understanding of the types of crashes, the motion of children and cars during crashes, and how restraints can work to minimise injury.

1 General information

Figure 1-1:
Types of vehicle crashes

(a) Frontal crash

(b) Side impact crash

(c) Roll-over crash

1.2.2 Type of crashes

The main types of crashes that child restraints are designed to protect child occupants are: frontal, side-impact, rear-impact and roll-overs. These types of crashes are illustrated in Figure 1-1. These crashes are over-simplifications of the complex combination of collisions that constitute motor vehicle crashes, but statistically, this tends to be how they are categorised. A research study on road crashes in which children were injured or killed found that:

- Frontal crashes accounted for 50 per cent of crashes and 55 per cent of the injuries
- Side impacts accounted for 27 per cent of crashes and 27 per cent of the injuries
- Rear impacts accounted for 15 per cent of crashes and 11 per cent of the injuries
- Roll-overs accounted for 7 per cent of crashes and 7 per cent of the injuries.

While roll-overs were less frequent than other types of crashes, around 12 per cent resulted in an injury to a child occupant. This was followed by frontal collisions (around 2 per cent), side-impact collisions (around 1.5 per cent) and rear-impact collisions (less than 1 per cent). It should also be noted that there are many factors besides the direction of the collision that can influence the injuries incurred, including age of the child, model of car, presence of airbags, seating position, the use of restraints, the type of restraint and how restraint was used. The importance of each of these factors is covered in the sections that follow.

1.2.3 Newton's laws of motion

The energy exchange that causes tissue damage (injuries) to vehicle occupants during motor vehicle crashes can be explained by Newton's laws of motion:

- A body at rest will remain at rest and a body in motion will remain in motion unless acted on by an external force. When a car crashes, the occupants continue moving at the speed of the vehicle immediately before impact. If unrestrained, these occupants will hit the decelerating interior of the vehicle at their pre-crash speed, or be ejected from the vehicle and hit the ground or a roadside object. Figure 1-2 shows a still image when a vehicle hits an object.

1 General information

- The force (F) applied to a body is a function of its acceleration (a) and its mass (m) which can be expressed as F=m * a. In a crash where a vehicle's occupant is wearing a seat belt, the belt will cause the wearer to decelerate at the same speed as the vehicle, maximising the distance over which the occupant comes to a stop, thereby reducing the force he/she experiences. The exterior of the car experiences the 'first collision' which - depending upon the direction of the collision - can be slowed down by the car's exterior design. The 'second collision' is between the occupant and their restraint system, also designed to spread the change in velocity over more time – thereby reducing the force on the body. An example of this mechanism is shown in Figure 1-3 where the collision is slowed down by the airbag.
- **For every force there is an equal and opposite force, or reaction.** A body will push back or deform when a force is applied to it. The greater the area over which a force is spread the more there is to absorb the force. Restraints are designed to spread these forces over the strongest parts of the body (skeleton) to minimise the risk of injury.

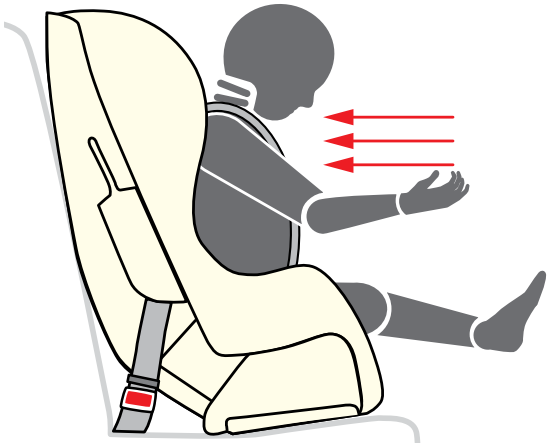
In summary, a car crash is a real world demonstration of Newton's laws of motion. Coming to a stop, as happens in a crash, results in forces being applied to the vehicle occupants. The greater the change in velocity that the body experiences or the shorter the time taken to decelerate, the greater the force experienced. While vehicle design can do much to absorb the forces of impact, a child restraint works to firstly prevent a child from striking rigid surfaces, and secondly to spread the forces over a wider body area. Both these factors are vital to minimise injury.

Figure 1-2:
Vehicle colliding with an object

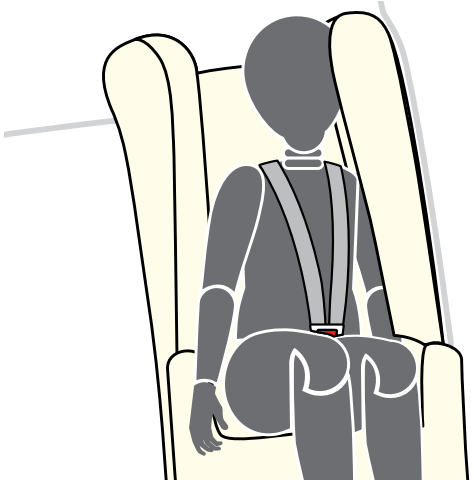
Figure 1-3:
Vehicle occupant colliding with vehicle interior

Figure 1-4:
How a child restraint prevents injury in a crash

(a) A photo showing an appropriate restraint use



(b) The restraint spreads the forces to prevent injury in a frontal crash



(c) The restraint cushions the child occupant in side impact crash

1.2.4 How child restraints prevent injury

A child restraint is designed to spread the forces over a child's body so as to reduce the tissue damage that would result if it were applied to only a small area (such as when a child's head hits a windscreen). Further, the more energy absorbing the material from which child restraints are made, compared to the interior of the car or objects outside the car, means that the deceleration is slower and the resultant forces being exchanged are reduced.

The four main functions of a seatbelt or child restraint are to:

- Prevent the child from hitting the vehicle interior or intruding objects
- Spread the forces over strong parts of the body - the bony pelvis and rib cage
- Limit harmful movements of the body, such as excessive bending of the spine
- Allow the crumple zone of the car to absorb the energy exchanged during a crash rather than a child's body, which would occur if the child were not held firmly within their seat.

In order for a restraint to perform these functions optimally, it is important that children are in the correct restraint for their age and size, that they are using the restraint properly and that the restraint has been correctly installed in the vehicle. Furthermore, there should be no objects that interfere with the correct performance of a restraint during a crash or that can collide with the child or another occupant in the vehicle. Figure 1-4 (a) shows an appropriate restraint use (b) the restraint spreads the forces to prevent injury in a frontal crash (c) the restraint cushions the child occupant in a side impact crash.

1 General information

1.2.5 Videos of crash testing

The following links show examples how child restraints prevent injury in a crash:
https://www.childcarseats.com.au/testing-explained
http://www.youtube.com/watch?v=qUoE5YTdWPI

Video 1: Examples on how child car seats are tested

Video 2: Commodore at 60km and 100km

Figure 1-5:
A rearward-facing child restraint installed in a vehicle

1.3 Types of child restraints

1.3.1 Overview

This section covers types of child restraints and the differences between each version of the standard AS/NZS 1754.

Child restraints are categorised into several types based on the size and age of children they are designed to accommodate. These types of restraints are described as in the following sub sections:

1.3.2 Rearward-facing child restraints (Types A1, A2 and A4)

Rearward-facing restraints are for infants up to 6 months old for Type A1 or up to 12 months old for Type A2 and up to 30 months old for Type A4. These restraints provide better crash protection for infants and toddlers because they distribute crash forces more evenly over a greater area of the child's body and because they minimise the risk of the infant's disproportionately large head adversely loading the neck.

Each type has an inbuilt harness system with 5 or 6 points of attachment to the restraint shell. The restraint is held in place by a seatbelt and a top tether strap. An example of this type of restraint is shown in Figure 1-5. Some rearward-facing restraints are ISOFIX compatible where they are connected to the vehicle using the ISOFIX connectors. See Section 1.3.9 for more details on ISOFIX.

1.3.3 Forward-facing child restraints

Forward facing child restraints are fitted using the car seat belt and a tether strap that attaches to an anchor point. Similar to rearward-facing restraints, some forward facing restraints are ISOFIX compatible where they are connected to the vehicle's lower anchorages using the ISOFIX connectors. See Section 1.3.9 for details on ISOFIX.

Depending on their designation, forward facing child restraints are divided into two types: Type B and Type G.

1.3.3.1 Type B forward-facing child restraints

Type B forward-facing child restraints with inbuilt harness are designed for children from 6 months old to approximately 4 years old. An example of this seat is shown in Figure 1-6.

Figure 1-6:
Type B Forward-facing child restraint

Figure 1-7:
Type G forward facing child restraints

1.3.3.2 Type G forward facing child restraints

Type G forward-facing child restraints with inbuilt harness are designed for children from 6 months old to approximately 8 years old. An example of this seat is shown in Figure 1-7.

1.3.4 Convertible rearward/forward-facing child restraints (Type A/B)

Convertible rearward/forward-facing child restraints combine the features of rearward- facing and forward facing restraints in one child restraint. These restraints are suitable for infants in rearward-facing mode (see Figure 1-8) and then be converted to forward facing mode for toddlers (see Figure 1-9). Most convertible Type A/B restraints come with a detachable insert to support the child's head and sometimes come with torso supports.

Convertible restraints are generally larger than a dedicated rearward-facing or a dedicated forward-facing child restraint. As a result, when they are used as rearward-facing restraints, they cannot always be reclined to the degree they should be, resulting in the infant sitting in a too upright position.

Because of the need to cater for larger children, their shoulder harness webbing is wider than in dedicated rearward-facing child restraints and is not be suitable for low birth weight infants.

1.3.5 Booster seats

Booster seats are designed to position the adult lap-sash seatbelt correctly across the child's shoulder and thighs and must not be used with lap-only belt. If a lap-sash belt is not available, the child can use a lap-only belt with a child safety harness and a compatible booster seat that has been shown to prevent submarining, however it is recommended that a child safety harness is only used when it is not possible to replace the lap only seatbelt with a lap-sash seatbelt.

Depending on their designation, booster seats are divided into two types: Type E and Type F.

1.3.5.1 Type E booster seats

Type E booster seats are designed to accommodate children from 4 to 8 years.

There are two types of Type E booster seats, namely:

- Booster cushions are a booster seat without back and side wings and are being phased out from the Australian Standard. Although they are still legal to use, they are not recommended as they do not offer any head or side support. These cushions can collapse and promote submarining in the event of a crash. Examples of this booster cushion are illustrated in Figure 1-10.
- Booster seats that have a back and sides (for head protection in side impacts) may be equipped with a sash guide(s) and/or a top tether strap (if the seat weighs over 2kg). An example of this booster seat is shown in Figure 1-11a. Some booster seats come with an adjustable head rest which can be adjusted to suit the child's head position. Figure 1-11b shows this type of booster seat.

Figure 1-10:
Example of booster cushion without back

Figure 1-8:
Rear/forward facing convertible in rearward-facing mode

Figure 1-9:
Rear/forward facing convertible in forward-facing mode

Figure 1-11:
Booster seats

(a) Standard booster seat

(b) Booster seat with adjustable head rest

Figure 1-12:
Type F booster seat

Figure 1-13:
Forward facing/booster seat convertible

(a) Forward-facing mode

(b) Booster seat mode

Figure 1-14:
Integrated booster cushion

1.3.5.2 Type F Booster Seats

Type F booster seats are designed to accommodate children from 4 to 10 years old. They also have a narrower base to better allow three child restraints be installed across the rear seat of most cars, and better access to the seatbelt buckle for doing up the belt. An example of this seat is shown in Figure 1-12.

1.3.6 Convertible forward-facing/booster seats, Type B/E and Type B/F

Convertible forward-facing child restraints/booster seats combine the features of forward facing restraints for young children and booster seats for older children. These restraints come with an inbuilt harness and a top tether strap. The harness is used until the child's shoulders have exceeded the upper shoulder markers. When the child has outgrown the inbuilt harness, the inbuilt harness is removed and the restraint is used as a booster seat. An example of this type of seat when positioned as a forward facing mode is shown in Figure 1-13a and when converted in a booster seat is shown in Figure 1-13b.

1.3.7 Integrated booster cushions/seats

An integrated (or integral) booster cushion/seat is one that is built into some vehicles by the vehicle manufacturer and is used in conjunction with the adult lap-sash seatbelt. An example of this type of seat is shown in Figure 1-14.

The occupant's minimum and maximum weight restrictions for integrated booster cushions are specified in the vehicle owner's manual. An integrated booster cushion is an approved booster seat and therefore can be used by a child aged 4 years and over.

1.3.8 Dickey seats

- Children aged between four to seven years old are allowed to occupy dickey seats without using a booster seat provided that they are secured in either the lap-sash seatbelt or the lap belt in combination with a child safety harness.
- Dickey seats can be installed as after-market options in non-passenger areas of the vehicle, such as in the cargo area of a station wagon. The guidelines on manufacture and installation of these seats are specified under the Vehicle Standard Bulletin No 5: *Commercial Manufacture and Installation of Additional Seats*. Only Category 2 and 3 seats can be installed in station wagons.

These dickey seats are usually limited to specific ages, weights and heights of children, and may not have appropriate anchorages for child restraint installation. Dickey seats should only be used when all adult seats are occupied. An example of this seat is illustrated in Figure 1-15.

- The Dickey seat manufacturer's recommendations for weight and height should be followed to avoid overloading the additional seat, or increasing the risk of head contacts with the vehicle interior.
- The 5-step test discussed in Section 1.5.2 should be used to determine whether a child is tall enough to sit in an additional seating position without a booster seat.

1.3.9 ISOFIX compatible child restraints

What is the ISOFIX System?

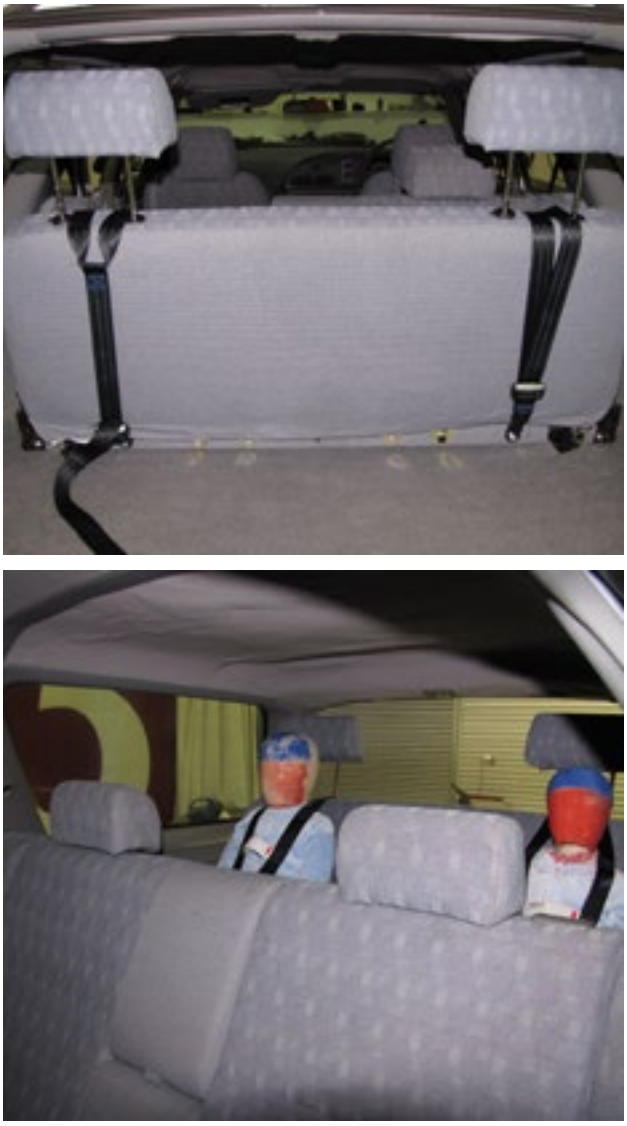
Designing vehicle seatbelts to achieve their primary purpose of protecting occupants creates challenges when installing child restraints in vehicles. An idea originated in Europe to develop a child restraint anchorage system that was independent of the vehicle seatbelt.

In 1989, the International Organization for Standardization (ISO) began work to develop an ISO standard for child restraint anchorages. This ISO standard was published in 1999 and is called the ISO 13216-1 *Standard Road vehicles – Anchorages in Vehicles and Attachments to Anchorages for Child Restraint Systems*.

The technical specifications of this ISO standard have already been adapted for use by the United States (2002), Canada (2002), Europe (2004) and Australia (2013). Each of these systems is different:

- In the United States this system is known as LATCH (Lower Anchors and Tethers for Children). The Federal Motor Vehicle Safety Standard (FMVSS 225) requires ISOFIX low anchorages in the vehicle, two lower attachments connectors at the base of the child restraint which may be either rigid or flexible, and a top tether strap.
- In Canada this system is known as the Universal Attachment System (UAS) and is very similar to the LATCH system in the United States.

Figure 1-15:
Dickey seat fitted in a station wagon



- In Europe this system is known as ISOFIX and includes three types – universal ISOFIX, semi-universal ISOFIX and vehicle specific ISOFIX. The United Nations Economic Commission for Europe Standard (UNECE R14) includes provisions on ISOFIX in the vehicle and a pair of rigid attachment connectors at the base of the child restraint, in addition to other requirements depending on the ISOFIX type.
- In Australia this system is known as ISOFIX compatible. The Australian Design Rules for vehicles provide an option for ISOFIX low anchorages in the vehicle with a corresponding top tether anchorage point. A pair of ISOFIX compatible lower attachment connectors for rearward and forward facing child restraints is provided as an option in AS/NZS 1754:2013 in addition to the top tether strap.

1 General information

Figure 1-16:
Vehicle with visible ISOFIX lower anchorages

Figure 1-17:
ISOFIX connectors

(a) Rigid lower attachment

(b) Flexible lower attachment

What has been introduced in Australia?

The ISOFIX compatible system for Australia is allowed by a combination of changes to the Australian Design Rules for vehicles (ADR 34) and the Australian/New Zealand Standard for child restraints (AS/NZS 1754).

The Australian Design Rules have been amended to set design and performance requirements for any new vehicle being supplied to Australia with ISOFIX low anchorages. Vehicle manufacturers, from 1 November 2012, could include ISOFIX low anchorages in new models of vehicles, and from 1 November 2013 for all other new vehicles of existing models.

An example of ISOFIX low anchorages is shown in Figure 1-16 below where they are located on the seat bight (between the seat back and cushion) of the vehicle rear seat.

The lower attachment connectors on the child restraint can either be a pair of rigid (Figure 1-17a) or flexible connectors (Figure 1-17b). The lower attachment connectors are incorporated into the child restraint design at the time of manufacture and connect to the vehicle's ISOFIX low anchorages.

Figure 1-18 illustrates the installation of an ISOFIX compatible restraint into the vehicle's seat where it connects to the vehicle's ISOFIX low anchorages and top tether anchorage point by using the top tether strap and the rigid or flexible lower attachment connectors located at the seat bight (junction of the vehicle's seat back and cushion).

1 General information

Figure 1-18:
ISOFIX compatible restraint fitted into the seat using the top tether strap and the lower anchorages located on the seat bight

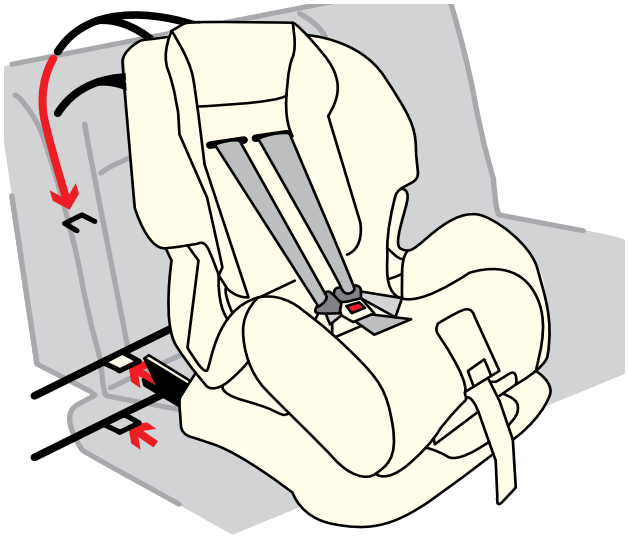


Figure 1-19:
Rigid connectors being connected to a vehicle seat

Figure 1-19 shows an ISOFIX compatible restraint with rigid connectors being connected to the vehicle's ISOFIX low anchorages.

ISOFIX compatible child restraints are also suitable for use in seating positions not fitted with ISOFIX low anchorages. To install the child restraint in the vehicle it requires the use of the vehicle seatbelt and top tether strap. When the vehicle seatbelt is being used, the lower attachment connectors on the child restraint are not required and can be retracted.

Child restraints purchased from overseas, including ISOFIX compatible child restraints, are illegal to use in Australia as they do not comply with AS/NZS 1754. Unlike the European standard, the Australian/New Zealand Standard requires all restraints to:

- have a top tether strap
- have a rebound prevention feature to keep a rearward-facing child restraint in the correct position in the event of a crash
- be tested in a side impact
- be tested in an inverted position to test for occupant ejection to ensure the child does not get ejected from their child restraint if the vehicle rolls.

AS/NZS 1754:2013 specifies child restraints Types A1/A2/A4, Type B, Type D, Type A1/B, Type A2/B, and Type A4/B are allowed to be fitted with ISOFIX attachment. Booster seats and their combinations cannot use ISOFIX anchorages as there has been some concern internationally about their likelihood for the occupant to submarine. ISOFIX anchorages are also not allowed in Type G restraints as the low anchorages may not be strong enough to withstand the loads.

1 General information

1.3.10 Detailed description of child restraint types

Prior to the introduction of the 2010 edition of AS/NZS 1754, restraint types were recommended based on the weight of the child. Current standards are now based on the age and guided by shoulder height markers on the restraint rather than by the child's weight (see Section 1.4 – Child Restraint Regulations), as many parents do not accurately know their child's weight beyond infancy. These shoulder markers were introduced in the 2010 version of AS/NZS 1754.

Since Australian restraints are tested with dummies that are significantly heavier than the maximum weight range for the age of children they are representing, exceeding the nominated weight range by a small amount (1-3kg) is unlikely to pose a significant risk to the structural integrity of the restraint in a crash as long as the child still fits in the restraint's inbuilt harness. Similarly, since the crash forces in booster seats are carried by the vehicle's inbuilt seatbelt, exceeding the weight limits should not pose a significant risk provided the child fits well within the child restraint.

Comparison of child restraint types specified in AS/NZS 1754 versions 2004, 2010 and 2013 is presented in Table 1-1.

Table 1-1:
AS/NZS 1754 versions 2004, 2010 and 2013 specifying the criteria for restraint selection for children

AS/NZS 1754	2004	2010	2013
Type A1	Rearward-facing chair with harness for infants up to 9kg and supine length up to 70cm.	Rearward-facing chair with harness for infants whose shoulders don't yet reach the shoulder height marker. Supine length up to 70cm (approx. 6 months of age).	Rearward-facing chair with harness for infants whose shoulders don't yet reach the shoulder height marker. Supine length up to 70cm (approx. 6 months of age).
Type A2	Rearward-facing chair with harness for infants up to 12kg.	Rearward-facing chair with harness for infants whose shoulders don't yet reach the shoulder height marker. Supine length up to 80cm (approx. 12 months of age).	Rearward-facing chair with harness for infants whose shoulders don't yet reach the shoulder height marker. Supine length up to 80cm (approx. 12 months of age).
Type A3	Transversely installed restraint for infants up to 9kg and supine length up to 70cm.	Transversely installed restraint for infants whose shoulders don't yet reach the shoulder height marker. Supine length up to 70cm (approx. 6 months of age).	Transversely installed restraint for infants whose shoulders don't yet reach the shoulder height marker. Supine length up to 70cm (approx. 6 months of age).
Type A4	—	—	Rearward-facing chair with harness for children whose shoulders reach the shoulder height marker (approx. 30 months of age).
Type A1/0	—	—	Rearward-facing chair with harness for low birth weight infants and supine length up to 70cm (approx. 6 months of age).

1 General information

AS/NZS 1754	2004	2010	2013
Type A2/0	—	—	Rearward-facing chair with harness for low birth weight infants and supine length up to 80cm (approx. 12 months of age).
Type A3/0	—	—	Transversely installed restraint for low birth weight infants and supine length up to 70cm (approx. 6 months of age).
Type A4/0	—	—	Rearward-facing chair with harness for low birth weight infants until shoulders reach the shoulder height marker (approx. 30 months of age).
Type B	Forward-facing child restraint for children whose weight ranged between 8-18kg.	Forward-facing child restraint for children whose shoulders are above the lower shoulder height marker and until they reach the upper shoulder height marker (approx. 6 months to 4 years of age).	Forward-facing child restraint for children whose shoulders are above the lower shoulder height marker and until they reach the upper shoulder height marker (approx. 6 months to 4 years of age).
Type C	Child safety harness for children whose weight ranged between 14-32kg.	Child safety harness for children aged approx. 4-7 years: to be used with a compatible booster seat. Ages approx. 8-10 years: to be used with a compatible booster seat or vehicle seat with a lap-only belt.	Child safety harness: Type C1: for use with suitable booster seat and lap-only belt, for approx. 4-10 years of age, depending on booster seat used. Type C2: for use on vehicle seat with lap belt only for children approx. 7-10 years of age. Not suitable for use with a booster seat.
Type D	Rearward-facing child restraint whose weight ranged between 8-18kg.	Rearward-facing child restraint for children in the rearward-facing position whose shoulders are above the lower shoulder height marker until they reach the upper shoulder height marker (approx. 6 months to 4 years of age).	Rearward-facing child restraint for children in the rearward-facing position whose shoulders are above the lower shoulder height marker until they reach the upper shoulder height marker (approx. 6 months to 4 years of age).

1 General information

AS/NZS 1754	2004	2010	2013
Type E	i) Booster cushion/ seat for children whose weight raged between 14-26kg or ii) a converter for children whose weight raged between 18-32kg.	Booster seat for children whose shoulders are above the lower shoulder height marker until they reach the upper shoulder height marker (approx. 4-8 years of age whose height is less than 128cm). To be used with either a lap sash seatbelt or an add-on accessory harness.	Booster seat for children whose shoulders are above the lower shoulder height marker until they reach the upper shoulder height marker. To be used with either a lap sash seatbelt, or it can be used with an add-on accessory harness and lap-only belt that is approved with this booster seat. (approx. 4-8 years of age whose height is up to 128cm).
Type F	—	■ Booster seat for children whose shoulders are above the lower shoulder height marker until they reach the upper shoulder height marker (approx. 4-10 years of age whose height is up to 138cm). To be used with a lap sash seatbelt. Can be used with a child safety harness and lap only belt. ■ Converter used in conjunction with a seatbelt, suitable for children approximately 8 to 10 years of age.	Booster seat for children whose shoulders are above the lower shoulder height marker until they reach the upper shoulder height marker. To be used with either a lap sash seatbelt or an add-on accessory harness. Can be used with a child safety harness which is approved with this booster seat and lap-only belt. (approx. 4-10 years of age whose height is up to 138cm).
Type G	—	—	Forward-facing chair with harness for children whose shoulders are above the lower shoulder height marker until they reach the upper shoulder height marker (approx. 6 months to approx. 8-10 years of age).
Type H	—	—	Converter a) for children aged approx. 4-7 years: to be used with a compatible booster seat b) for children aged approx. 7-10 years: to be used with a seatbelt without a booster seat.

1 General information

1.4 Child Restraint Regulation

1.4.1 Summary of child restraint regulation

The current child restraint regulations were implemented as state laws in NSW in March 2010 and are administered through the [NSW] Road Rules 2014 (the Road Rules). Under the Road Rules, all children under 7 years of age must be restrained in a suitable and approved child restraint or booster seat when travelling in a motor vehicle. The type of restraint that a child must use depends on the age of the child. Details of the Road Rules are summarised in Table 1-2 and Table 1-3.

Table 1-2:
Summary of the Road Rules related to child restraint use

Child Age	Rules and Type of restraint
Birth to under 6 months old	Children under 6 months must be restrained in an approved rearward-facing restraint (Types A1, A2, A3 or A4) that is properly fitted to the vehicle and adjusted to fit the child's body correctly.
From 6 months to under 4 years old	Children from 6 months to less than 4 years old must be restrained in either a properly fastened and adjusted approved rearward-facing child restraint (Types A1, A2, A3 or A4) or properly fastened and adjusted approved forward-facing child restraint with inbuilt harness (Type B or G).
From 4 years old to under 7 years old	Children from 4 years and less than 7 years old must be restrained in an approved forward-facing restraint (Type B or G) or booster seat (Type E or F) that is properly fitted to the vehicle and adjusted to fit the child's body correctly or if he or she is seated in a Dickey Seat be secured by a lap sash seatbelt, or a lap seatbelt in combination with child safety harness.
From 7 years old to 16 years old	Children aged 7 years and under 16 years old must be restrained in a properly worn seatbelt, or Type G restraint, or booster seat (Type E or F) that is properly fitted to the vehicle and adjusted to fit the child's body correctly.

Table 1-3:
Summary of the NSW regulations for child restraint and seat belt use

Issue	Requirements in NSW
Sharing of seatbelts	It is illegal for a seatbelt to be shared either by an adult with a child seated on their lap or by children sitting side by side. There must be only one passenger for each seating position and one seatbelt for each passenger.
Front seat	■ Children under 4 years old must not be seated in the front seat in vehicles with two or more rows of seats. ■ Children 4 years to less than 7 years old can only be seated in the front if all other seats in the row(s) behind are occupied by other passengers less than 7 years old.
Complying child restraints	Child restraints must comply with AS/NZS 1754. It is illegal to use a child restraint that does not comply with AS/NZS 1754.
Additional seats	Additional seats are permitted for use by children aged 4 to 7 years, without the need to be used in conjunction with a booster seat or child restraint, provided the seat is suitable for the children's size and weight and a lap-sash seatbelt or a lap seatbelt with an approved child safety harness is used.

1 General information

Issue	Requirements in NSW

Taxis	In NSW taxi drivers are required to ensure:
	■ All passengers younger than 12 months must be secured in a child restraint.
	■ All passengers aged over 12 months and under 7 years must use a child restraint or booster seat if available. If no restraint is available the child passenger must:
	  ■ occupy a seating position that is fitted with a suitable seatbelt, and
	  ■ not occupy the same seating position as another passenger (whether or not the other passenger is exempt from wearing a seatbelt under rule 267), and
	■ wear the seatbelt properly adjusted and fastened.
	■ No passenger under 4 years old is in the front seat and a child 4 years or older but under 7 years may only sit in the front row if all of the other seats in the row or rows behind the front row are occupied by passengers who are also under 7 years old.
	Taxi drivers do not have to provide child restraints or booster seats. However, they must ensure there is at least one anchor fitting ready for passengers who wish to supply their own.

Motorcycles	The rider of a motorcycle must not ride with a passenger who is under 8 years old unless the passenger is in a sidecar. A passenger must not ride in a sidecar of a motorbike unless the passenger is seated safely and wearing a helmet.

Buses	**Buses (more than 12 seats)**
	A driver of a bus, that is designed to seat over 12 adults (including the driver), is not required to ensure passengers, including those under 16 years of age are in a restraint. It is recommended that where a restraint is available, it should be worn.
	Small bus (between 9 to 12 seats including the driver's seat)
	A driver of a small bus providing a public passenger service under the *Passenger Transport Act 1990* must ensure that:
	■ All passengers younger than 12 months are secured in a child restraint.
	■ All passengers aged over 12 months and under 16 years:
	  ■ occupy a seating position that is fitted with a suitable seatbelt, and
	  ■ not occupy the same seating position as another passenger, and
	  ■ wear the seatbelt properly adjusted and fastened.
	■ No passenger under 4 years old is in the front seat and a child 4 years or older but under 7 years may only sit in the front row if all of the other seats in the row or rows behind the front row are occupied by passengers who are also under 7 years old.
	A driver of a small bus not providing a public passenger service under the *Passenger Transport Act 1990* is required to fully comply with the child restraint laws and must ensure that all passengers under 7 years old are appropriately restrained in an approved child restraint or booster seat.
	Buses fitted with 2 for 3 seats
	Three children under the age of 12 years old are allowed to occupy a 2 for 3 seat and must wear the seatbelt properly adjusted and fastened.

1 General information

Issue	Requirements in NSW
Coaches and public buses	Drivers of public transport buses and coaches are not required to ensure that children are restrained according to the child restraint laws.
Vehicles with side facing seats	There are no regulations specific to children occupying side facing seats. However, the Road Rules require that a child restraint or seatbelt must be properly adjusted, and correct installation of a restraint precludes installation in a side facing seat.
Modification for children with special needs	If any modification is made to a restraint or to the child's use of a restraint, even if for a short-term medical condition, a medical certificate must be carried within the vehicle.

1.4.2 Approved child restraints

The definition of an 'approved child restraint', 'approved booster seat', and 'approved child safety harness' referred to in the Road Rules are:

'approved child restraint' means a child restraint that:

a) is or was designated as a Type A1, A1/0, A2, A2/0, A3, A3/0, A4, A4/0, B, D, G or H child restraint under the relevant Australian Standard, and

b) complies with the edition of the relevant Australian Standard that was in force at the time of its manufacture in Australia or importation into Australia (as the case may be) or with any later edition of the Standard in force at the time the restraint is being used, and

c) has an identifying mark from a body accredited or approved by the Joint Accreditation System of Australia and New Zealand that certifies compliance with the edition concerned of the Standard.

'approved booster' seat means any of the following:

a) a booster seat or booster cushion that:

   i. is or was designated as a Type E or Type F child restraint under the relevant Australian Standard, and

   ii. complies with the edition of the relevant Australian Standard that was in force at the time of its manufacture in Australia or importation into Australia (as the case may be) or with any later edition of the Standard in force at the time the seat or cushion is being used, and

   iii. has an identifying mark from a body accredited or approved by the Joint Accreditation System of Australia and New Zealand that certifies compliance with the edition concerned of the Standard.

b) a booster seat or cushion that:

   i. is an integrated part of a motor vehicle, and

   ii. was installed by the manufacturer of the motor vehicle to enable an existing adult lap-sash seatbelt to become suitable for use by a child, and

   iii. complies with the relevant Australian Design Rules under the *Motor Vehicle Standards Act 1989* of the Commonwealth for child restraints of the type concerned that was in force at the time the vehicle was manufactured or imported into Australia (as the case may be) or with any later edition of those Rules in force at the time the seat or cushion is being used.

'approved child safety harness' means a harness that:

a) is or was designated as a Type C child restraint under the relevant Australian Standard, and

b) complies with the edition of the relevant Australian Standard that was in force at the time of its manufacture in Australia or importation into Australia (as the case may be) or with any later edition of the Standard in force at the time the harness is being used, and

c) has an identifying mark from a body accredited or approved by the Joint Accreditation System of Australia and New Zealand that certifies compliance with the edition concerned of the Standard.

1 General information

And the definition of relevant Australian Standard is defined as:

'relevant Australian Standard' means any of the following editions of the Australian/New Zealand Standard for child restraint systems for use in motor vehicles (as in force from time to time):

a) AS/NZS 1754:1995,

b) AS/NZS 1754:2000,

c) AS/NZS 1754:2004,

d) any subsequent edition of the Standard.

More details on the Road Rules – Rule 266. "Wearing of seatbelts by passengers under 16 years old" can be found on the following website:

http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+758+2014+cd+0+N

1.4.3 Penalties for not using approved child restraints

The driver of a vehicle could be fined and lose demerit points for failing to comply with the Road Rules, including not securing the child passenger using an approved child restraint. The approximate fines and demerit points for failing to ensure all children are appropriately restrained are outlined in Table 1 4 below:

Table.1.4:
Penalties for failure to comply with child restraint or road rules in NSW.

	Penalties
Fine	$311
Demerit points	3 or 6 during double demerit periods

For up to date information, visit the Transport for NSW web page 'Demerit point offences':

http://www.rms.nsw.gov.au/cgi-bin/index.cgi?fuseaction=demeritpoints.browsehandler&category=Seat+-belts+%26+restraints&offence=

1.5 Best practices

1.5.1 General

Below is a list of best practices that restraint fitters should advise parents/carers to help ensure that their children are correctly transported in the most suitable child restraint restraints. Where appropriate, fitters should demonstrate how to fit the restraint. Restraint fitters should also give parents and carers the knowledge to install their child's restraint correctly and to move restraints between vehicles.

1.5.2 When to move a child to the next type of child restraint

Children should be moved to the next type of restraint when they no longer fit in their current child restraint.

From a rearward-facing child restraint to a forward-facing restraint

A child should be moved:

- When he/she is aged between 6 or 12 months (depending on the type of rearward facing child restraint used) and is able to hold their head up; or
- When his/her shoulders are above the top harness slot; or
- If the child restraint is a convertible rearward-facing infant restraint (Type A/B), move the child when their shoulders are just above the top harness slot nominated for rearward-facing use; or
- If the child restraint has shoulder marks printed or sewn on the cover, move the child when his/her shoulders have passed the upper marks as seen in Figure 1-20(a), or for Type A/B convertible restraints, when the shoulders are above the transition marker, as shown in Figure 1-20(b).

From a forward-facing child restraint to a booster seat

A child should be moved:

- When his/her shoulders no longer fit comfortably within the child restraint; or
- When his/her eye-level is higher than the back of the child restraint; or
- When the top harness slots are below the level of his/her shoulders; or
- If the child restraint has shoulder marks, move the child to a booster seat when his/her shoulders have passed the upper marks, or for Type B/E convertible restraints, when the shoulders are above the transition marker.

From a booster seat to a seatbelt

This five-step test can help assess whether a child is big enough to be safely restrained by a seatbelt. The child should be able to:

1. Sit with their back against the seat back
2. Bend their knees comfortably over the front of the seat cushion
3. Sit with the sash belt across their mid-shoulder
4. Sit with the lap belt across the top of their thighs
5. Remain in this position for the whole trip

Figure 1-20:
Forward-facing child restraint with shoulder height markers

(a) Upper shoulder markers

(b) Transition shoulder marker

If they do not pass this five-step-test in the position in which they will be seated, the child should either:

- remain in their Type E booster seat or move to a larger booster seat (Type F); or
- move to an adult seat belt when their shoulders have passed the bottom of the head restraint with the head restraint in the uppermost position.

1.5.3 Seating Position

When choosing seat positions for child passengers, as many of the following safety tips should be followed as possible:

- Children 12 years of age and under are safest in the rear seat. Injury risk to children 12 years of age and under is nearly double in the front seat compared to the back seat, irrespective of restraint type.
- For a child in a booster seat or an adult seatbelt, use a seating position with a lap-sash (lap and shoulder) belt.
- The top tether strap (if required) should not be able to fall into a gap between seat back sections such as if there is a split-folding seat, or off the side of a single seat.
- Entry and exit from the vehicle from the kerb side is safer than the road/traffic side.
- Avoid positions that allow interaction with other restraints, e.g. where an adjacent restraint might make it difficult to access the seatbelt buckle for a booster seat user.
- Choose positions where the child can be seen easily by the driver.

1.5.4 Airbags

Airbags are a proven vehicle safety feature. Airbags can help protect children by significantly reducing their risk of injury in a crash. However there is a chance children could be injured from the force of an airbag in a crash, particularly if they are not restrained correctly.

- Rearward-facing child restraints (Types A1, A2 and A4) must not to be used in the front row where a front passenger airbag is present.
- Forward-facing child restraints (Type B and Type G), booster seats and booster cushions may be used in the front seating position (e.g. in a vehicle with only one row of seats) where an airbag is designed to be deployed, but it is recommended that the vehicle seat be moved as far back as is possible without it affecting the seatbelt fit.
- Curtain airbags and torso airbags have not been shown to pose any risk to a properly restrained and positioned child, and may have safety benefits, but children should not rest any part of their body (particularly the head) on the window or sill in the deployment path of a curtain or torso airbag, and should also maintain an upright posture.

1.5.5 Further information

Further information about the child restraint regulation and best practices is included in the frequently asked questions attached in Appendix 1.

1 General information

Appendix 1 - Frequently asked questions by parents and carers

Transport for NSW has provided additional information on child restraint use and answers to frequently asked questions from parents. Fitters can refer parents and carers to these sites:

https://www.childcarseats.com.au/faqs

Question	Answer
Can my child sit in the front seat?	This depends on whether there is more than one row of seats in the car and the age of the child. **Where there are two or more rows of seats:** ■ A child under four years of age cannot sit in the front row if there is more than one row of seats, even if they are large enough to fit in a booster seat. ■ A child between four years of age and seven years of age cannot sit in the front row if there is more than one row of seats, unless the other rows are occupied by younger children in approved child restraint. However, for their safety, it is strongly recommended that children up to and including 12 years of age always sit in the rear seat. As front seats do not have child restraint anchorage points supplied, child restraints and booster seats with top tether straps cannot be used in these seating positions, unless an anchorage point has been retro-fitted. **Where there is only one row of seats (for example a single-cab ute or sports car with a front anchorage point):** ■ A child of any age can sit in the front seat provided they are properly restrained. ■ However, most car manufacturers recommend against the use of rearward-facing child restraints in front passenger seats.
If I have four children under 7 years of age can I carry them all in my car?	This will depend on the age of your children and the size of your car, as well as the type of child restraints including booster seats you have. If you have a standard sedan with two rows of seats you should be able to accommodate three child restraints in the second row and carry one child aged over four years in the front row. As front seats do not have child restraint anchorage points supplied, child restraints and booster seats with top tether straps cannot be used in these seating positions, unless an anchorage point has been retrofitted. Booster seats weighing less than 2 kg do not require a top tether strap. There are a range of child restraints including booster seats available with narrow bases that may be suitable for your child and car. You can find the child restraint dimensions in www.childcarseats.com.au website to see if the seat will fit in your car.

1 General information

Question	Answer

What if I need to take my child in a taxi or a bus?	**In taxis**
	In NSW, taxi drivers are required to ensure:
	■ All passengers younger than 12 months must be secured in a child restraint.
	■ All passengers aged over 12 months and under 16 years must:
	  ■ Occupy a seating position that is fitted with a suitable seatbelt, and
	  ■ Not share a seatbelt.
	■ Passengers under 4 years old must not be in the front seat.
	■ Passengers aged between 4 years and under 7 years may sit in the front seat only if the rear seat(s) are occupied by passengers under seven years old.
	In NSW, one in ten taxis carries an approved child restraint. If you need a child restraint for your child, you should ask for one when booking a taxi or take one with you.
	It is recommended that parents provide their own child restraint when travelling in a taxi.
	In buses (more than 12 seats)
	A driver of a bus that is designed to seat over 12 adults (including the driver), is not required to ensure passengers, including those under 16 years of age are in a restraint. It is recommended that where a restraint is available, it should be worn.
	In small Buses (9 to 12 seats)
	In NSW, a driver of a small bus (between 9 to 12 seats including the driver) providing a public passenger service under the *[NSW] Passenger Transport Act 1990* must ensure:
	■ All passengers younger than 12 months must be secured in a child restraint.
	■ All passengers aged over 12 months and under 16 years must:
	  ■ occupy a seating position that is fitted with a suitable seatbelt, and
	  ■ not occupy the same seating position as another passenger (whether or not the other passenger is exempt from wearing a seatbelt under Rule 267 of the Road Rules), and
	  ■ wear the seatbelt properly adjusted and fastened.
	■ No passenger under 4 years old is in the front seat
	■ A child 4 years or older but under 7 years may only sit in the front row if all of the other seats in the row or rows behind the front row are occupied by passengers who are also under 7 years old.
	A driver of a small bus not providing a public passenger service under the *[NSW] Passenger Transport Act 1990* is required to fully comply with the child restraint laws and must ensure that all passengers under 7 years old are appropriately restrained in an approved child restraint or booster seat.

Can I use a child restraint I have brought with me from overseas?	No. Child restraints bought overseas do not comply with Australian Standards and they are not compatible with Australian vehicles. Australian vehicles have a unique top-tether strap anchorage system, with which only Australian Standard approved child restraints are compatible.

1 General information

Question	Answer
Can I use an accessory child safety harness with a booster seat?	A child safety harness is difficult to fit correctly. Research recommends using a child safety harness only in situations where it is not possible to replace your lap-only seatbelt with a lap-sash seatbelt. In this case, it is recommended to use a booster seat with an anti-submarining feature. If you must use a child safety harness, ensure that the shoulder straps are not too tight and that the lap part of the seatbelt is very low across the thighs, otherwise it may ride up into the child's stomach area. Incorrect use of a child safety harness may cause severe submarining and direct contact between the harness system and the child's neck. Remember, every child must be suitably restrained when travelling in a vehicle, unless you have and carry a current certificate signed by a medical practitioner exempting your child due to medical reasons.
If my family has more than four children can I carry them in my vehicle?	Most cars sold in Australia have three child restraint anchorage points fitted as standard. If your car has three rows of seats, it is possible to carry more than four children, however, additional anchorage points must be retro-fitted to connect the top tether straps of any additional child restraints you place in the car. Front seats do not have child restraint anchorage points supplied. Child restraints and booster seats with top tether straps cannot be used in the front seat unless an anchorage point has been retro-fitted, however, booster seats weighing less than 2kg do not require a top tether strap. Some cars have additional third-row seats that are designed for use by children aged four and less than seven years, without the need to be used in conjunction with a booster seat or child restraint, provided the seat is suitable for the child's size and weight and a lap-and-sash seatbelt or lap seatbelt with an approved child safety harness is used. Authorised Restraint Fitting Stations offer specialist help to install additional anchorage points, retrofit lap and lap-sash seatbelts or fit child restraints that require vehicle modifications.
What is the Australian/ New Zealand Standard for child restraints?	The Australian/New Zealand Standard for child restraints is the Australian/New Zealand Standard 1754 *Child restraint systems for use in motor vehicles* (AS/NZS 1754). Standards are published documents that set out specifications and procedures designed to ensure products, services and systems are safe, reliable and consistently perform the way they are intended to. They establish a common language that defines quality and safety criteria. AS/NZS 1754:2013 is the current version and was published on 7 June 2013. This version introduces new requirements for a lower anchorage system for restraining a child restraint to the vehicle instead of using the seatbelt. Child restraints provided with this alternative option are defined in AS/NZS 1754 as "ISOFIX compatible child restraints".

1 General information

Question	Answer
How is ISOFIX being introduced in Australia?	The ISOFIX compatible system for Australia represents a combination of changes to the Australian Design Rules for vehicles (ADR 34) and the Australian/New Zealand Standard for child restraints (AS/NZS 1754). The Australian Design Rules have been amended to set design and performance requirements for any new vehicle being supplied to Australia with ISOFIX low anchorages. Vehicle manufacturers, from 1 November 2012, could include ISOFIX low anchorages in new models of vehicles, and from 1 November 2013 for all other new vehicles of existing models. ISOFIX low anchorages are a pair of dedicated anchorage bars, fitted to the junction of the vehicle's seat back and cushion, specifically for attaching a child restraint. The lower attachment connectors on the child restraint can either be a pair of rigid or flexible connectors. The lower attachment connectors are incorporated into the child restraint design at the time of manufacturer and connect to the vehicle's ISOFIX low anchorages.
How does the ISOFIX compatible system for Australia work?	In Australia, an ISOFIX compatible child restraint that complies with the Australian/New Zealand Standard 1754, connects to a vehicle's ISOFIX low anchorages and top tether anchorage point by using the child restraint's rigid or flexible lower attachment connectors and top tether strap. ISOFIX compatible child restraints that comply with AS/NZS 1754 are also suitable for use in seating positions not fitted with ISOFIX low anchorages. Install the child restraint in the vehicle by using the vehicle seatbelt and top tether strap. When the vehicle seatbelt is being used, the lower attachment connectors on the child restraint are not required and can be retracted.
What is the difference between rigid and flexible connectors?	Rigid or flexible connectors are incorporated into the design of the child restraint at the time of manufacture and both types are compatible with the vehicle's ISOFIX low anchorages. This is why the child restraint is called an ISOFIX compatible child restraint. Rigid connectors (see Figure 1-21a): A pair of rigid connectors is located at the base of the child restraint which connects to the vehicle's ISOFIX low anchorages. The top tether strap must be anchored to the vehicle. The vehicle seatbelt will not be required when the rigid connectors are being used. Flexible connectors (see Figure 1-21b): A pair of flexible straps with connectors is located at the base of the child restraint which connects to the vehicle's ISOFIX low anchorages. The flexible connectors are then adjusted to secure the child restraint firmly to the vehicle. The top tether strap must be anchored to the vehicle. The vehicle seatbelt will not be required when the flexible connectors are being used. **Figure 1-21: ISOFIX connectors**  **(a) Rigid connectors**  **(b) Flexible connectors**

1 General information

Question	Answer
How are AS/NZS 1754 ISOFIX compatible child restraints different to European and American versions?	Child restraints which comply with the Australian/New Zealand Standard for child restraints (AS/NSZ 1754), including ISOFIX compatible child restraints, are different to child restraints from overseas. For example, AS/NZS 1754 child restraints are required to: ■ have a top tether strap (that is independently tested for strength) ■ have a rebound prevention feature (to keep a rearward-facing child restraint in the correct position in the event of a crash) ■ be tested in a side impact (in the event of a side impact crash) ■ be tested in an inverted position to test for occupant ejection (to ensure the child does not get ejected from their child restraint if the vehicle rolls). It will continue to be illegal to use an ISOFIX compatible child restraint from overseas.
Is the ISOFIX compatible system for Australia easier to use?	It is not known at this stage whether the ISOFIX compatible system for Australia is an easier system to use. This depends on the design of the child restraint, the design of the vehicle, and the ease of access to the ISOFIX low anchorages in the vehicle. Australian research has shown that installing a child restraint using the vehicle seatbelt accounts for 25 per cent of misuse in forward facing restraints and 10 per cent misuse in rearward-facing restraints. ISOFIX and similar systems (for example LATCH) were designed to reduce serious installation errors when the vehicle seatbelt is used to secure the child restraint. However there is still potential for incorrect use of ISOFIX low anchorages. This was recently highlighted in an overseas study which showed 40 per cent of parents incorrectly connected the child restraint to the vehicle's ISOFIX low anchorages. Details of this research can be found in the Insurance Institute for Highway Safety Status Report (2012). Whether a child restraint uses ISOFIX compatible connectors or the vehicle seatbelt, parents and carers need to continue to take care when fitting and using child restraints. To protect a child in a crash, ensure the child restraint is: ■ the right size for the child ■ correctly fitted to the vehicle ■ properly adjusted and fastened.

1 General information

Question	Answer
Are all Australian child restraints ISOFIX compatible?	No. Child restraints that use the vehicle seatbelt and top tether strap continue to be available. The reason for introducing the ISOFIX compatible system to Australia is not because there are any concerns with the current Australian system of using the adult seatbelt and top tether strap to install child restraints. There is strong evidence that Australian child restraints, which use the top tether and vehicle seatbelt to secure the restraint to the vehicle, provide excellent protection to children, even in very high severity crashes. The ISOFIX compatible system for Australia provides consumers with greater choice. All AS/NZS 1754 child restraints, whether they are ISOFIX compatible or not, can be installed using the vehicle seatbelt and top tether strap.
How can I identify an AS/NZS 1754 child restraint?	When buying a child restraint or booster seat, look for the Australian and New Zealand Standard label on the seat and wording on the package that states it complies with AS/NZS 1754. Child restraints that meet the standards released in 2000, 2004, 2010 and 2013 are legal and can be used in motor vehicles throughout most of Australia.
Is a top tether strap still required to be used with an ISOFIX compatible child restraint?	Yes. Australian rearward and forward facing child restraints all require the use of the top tether strap. This continues to be required for all rearward and forward facing child restraints, including any AS/NZS 1754 ISOFIX compatible child restraints. A top tether strap prevents the child restraint from rotating forward in a crash and is tested for strength, independent of the ISOFIX low anchorages or vehicle seatbelt.
Do all vehicles have ISOFIX low anchorages?	No. Since 2000 some vehicles imported from Europe, Asia and the United States have arrived in Australia fitted with ISOFIX low anchorages. This has been included on a voluntary basis by the manufacturer, so not all vehicles sold in Australia have ISOFIX low anchorages.
My vehicle already has ISOFIX low anchorages fitted – can I use them?	A: Yes, provided the seating position has a corresponding top tether anchorage point and you are using an ISOFIX compatible child restraint that complies with the Australian/New Zealand Standard for child restraints (AS/NZS 1754). Some older vehicles may have ISOFIX low anchorages but no corresponding top tether anchorage point. A corresponding top tether anchorage point must be fitted before these ISOFIX low anchorages can be used. Contact your nearest Authorised Restraint Fitting Station, licensed certifier or vehicle engineer to determine if a top tether anchorage point can be installed.
How many ISOFIX low anchorages can be fitted in a vehicle?	ISOFIX low anchorages are built in to the vehicle at the time of manufacture, if the vehicle manufacturer chooses to provide them. The number of ISOFIX low anchorages depend on the design of the vehicle. Generally, ISOFIX low anchorages are located on the two outer seating positions in the second row, and not in the middle seating position. If you wish to use the middle seating position in the second row, you can still fit an ISOFIX compatible child restraint in the middle position by using the vehicle seatbelt and top tether strap. It is not recommended to have aftermarket ISOFIX low anchorages fitted.

1 General information

Question	Answer
Can I use an ISOFIX compatible child restraint in a seating position that is not fitted with ISOFIX low anchorages?	Yes. The Australian/New Zealand Standard for child restraints (AS/NZS 1754:2013) requires all child restraints (including ISOFIX compatible child restraints) to be able to be anchored to the vehicle using the vehicle seatbelt and the top tether strap.
Can I fit three ISOFIX compatible child restraints in the second row?	If provided, ISOFIX low anchorages are generally located on the two outer seating positions in the second row. The experience in Europe is that if using both pairs of ISOFIX low anchorages, it is unlikely that there will be room for a third child restraint or passenger in the same row. However, as ISOFIX compatible child restraints that comply with AS/NZS 1754 can be fitted to the vehicle using the vehicle seatbelt and top tether, it may be possible to use three restraints in the second row, depending on the size of the vehicle. Some manufacturers may offer three ISOFIX anchorages in the same row, however, it will depend on the size of your vehicle and whether you can fit three ISOFIX compatible child restraints side by side using the ISOFIX low anchorages.
Can I convert my existing child restraint to make it suitable to connect to ISOFIX low anchorages?	No. Only child restraints that have been specifically manufactured, crash tested, and certified to the Australian/New Zealand Standard (AS/NZS 1754:2013) can be used.
Can ISOFIX compatible child restraints be used in the front seat?	ISOFIX compatible child restraints cannot be used in the front row of vehicles with two or more rows of seats. In Australia, children aged under 7 years must not travel in the front seat of a vehicle with two or more rows of seats. However, if all rear seats are being used by children aged under 7 years, then children aged 4 years to under 7 years may travel in the front seat, provided they use a booster seat. If your vehicle does not have a rear row (for example, a ute) children are able to travel in the front row, provided they are restrained in a suitable child restraint that is properly adjusted and fastened. A rearward-facing child restraint cannot be used in the front row where a passenger airbag is fitted.
Is there an ISOFIX compatible booster seat?	No. AS/NZS 1754:2013 only allows child restraint manufacturers to produce ISOFIX compatible rearward and forward facing child restraints, not booster seats.

2

Installation and use of child restraints

 A fitter is adjusting the 5 point harness

2 Installation and use of child restraints

2.1 Overview

This section covers how to correctly install different types of restraints in vehicles that have had child restraint anchorages and how to properly secure the child in the restraint. For vehicles that do not have child restraint anchorage, see Module 3.

Parents and carers should be shown how to correctly install their child's restraint, and how to correctly secure the child in the restraint. They should also be shown how to adjust the restraint as the child grows.

2.2 Child restraint installation

Before starting the installation of a child restraint in a vehicle, restraint fitters must:

- check the restraint is in a good condition and in working order
- check that the restraint is not more than 10 years old
- make sure that the restraint meets AS/NZS 1754
- not repair damaged or worn restraints

  Note: If a child restraint is damaged, the restraint fitter should advise the customer to send it to the manufacturer for repair.

When installing child restraints, the restraint fitter must install them according to the restraint manufacturers' instructions as outlined in the instruction booklet or sheet supplied with the restraints. Information provided below is for general reference only or where this information is not available.

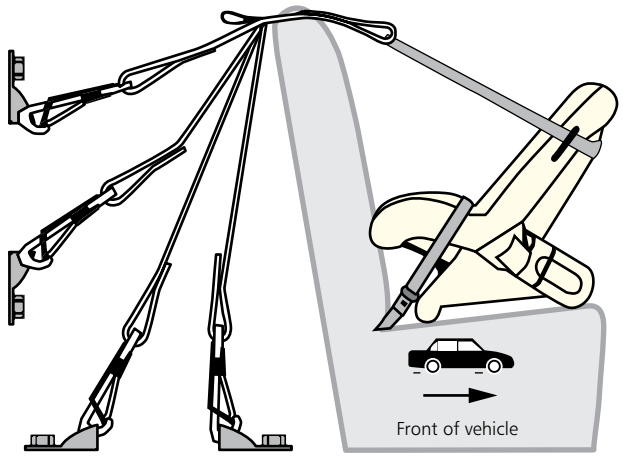
General guidelines on installing child restraints:

- Child restraints in Australia are required to be installed using a seatbelt or ISOFIX connectors and a top tether system. Top tethers have been shown to be highly effective in reducing injuries compared to restraints that are installed with just a seatbelt.
- Neither the seat belt nor the top tether strap should be twisted except, for those convertible child restraints where half a twist in the top tether is necessary.
- All rearward-facing restraints, forward-facing restraints, and booster seats over 2kg are required to be installed with a top tether strap that anchors the restraint to the vehicle, reducing movement of the restraint in a crash.
- It is important to always connect the top tether strap to the correct child restraint anchorage point in the vehicle and tighten the strap to remove slack. The anchorage clip must be installed correctly as shown in Figure 2-1a. If the clip is incorrect installed, as shown in Figure 2-1b, it may inadvertently detach from the anchor fitting especially if the black plastic keeper is missing from the hook. Always ensure the keeper is in place.

Figure 2-1: Attaching top tether strap anchor fitting into a child restraint anchorage.

✓ CORRECT

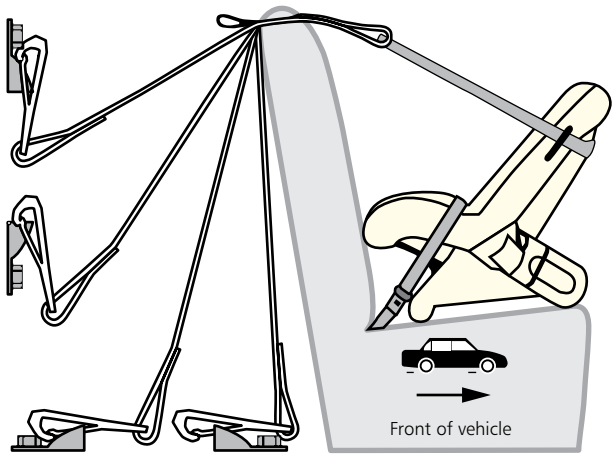
Correct engagement of attachment clip to anchor fitting when the attachment clip cover is used.



✘ INCORRECT

Incorrect engagement of attachment clip to anchor fitting when attachment clip cover is not used.

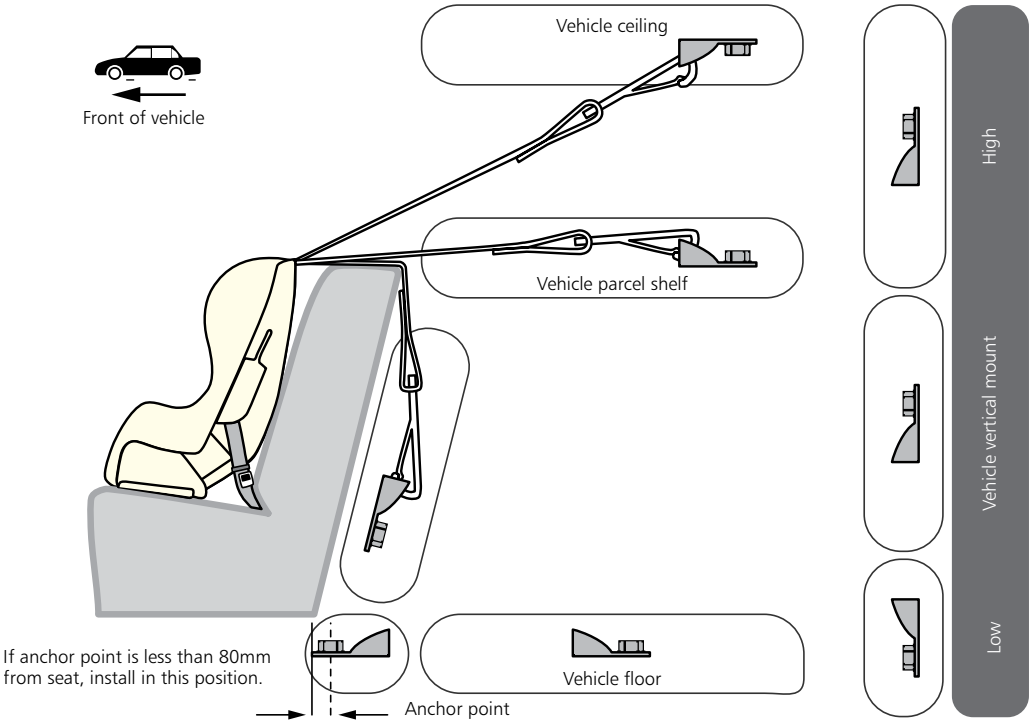
Be sure that the attachment clip is not lying flat on the anchor fitting as shown below.



Note: Fittings have been enlarged and straps have been lengthened/shortened to improve clarity of the diagram.

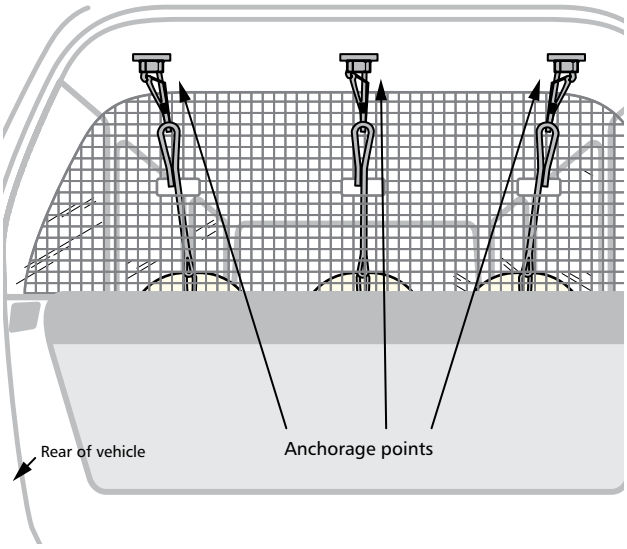
2 Installation and use of child restraints

Figure 2-2:
Possible locations of child restraint anchorage point for attaching the anchorage clip.



- Figure 2-2 shows the correct orientation of the top tether strap anchor fitting into a few possible child restraint anchorage locations. The location of the child restraint anchorage points can be found in the vehicle's user manual.
- Care must be taken not to attach the tether strap to a luggage tie-down or other non-complying child restraint anchorage points.
- Always ensure that the seatbelt and top tether strap are firmly adjusted by pushing the restraint toward the vehicle's seat, without over-tightening the seatbelt or the top tether. Over-tightening may reduce the crash performance of the restraint. It can also leave the restraint permanently distorted.
- For installation of child restraints in vehicles fitted with cargo barriers, it is sometimes necessary for the top tether strap to pass through the cargo barrier. In these instances, plastic cover strips are available to ensure a smooth surface is provided for the top tether strap to pass over when it passes through the cargo barrier. See Figure 2-3.

Figure 2-3:
Cargo barrier fitted in a station wagon with provision for the passage of top tether straps.



2 Installation and use of child restraints

2.2.1 Installing rearward-facing child restraints (Types A1, A2 and A4)

- For restraints that are designed with a base that separates from the carrier, the base should be installed separately first by placing the base on the seating position at the correct recline angle and then threading the seatbelt through the seatbelt path in accordance with the restraint manufacturer's instructions. In restraints manufactured to AS/NZS 1754:2010 onwards, the rearward-facing seatbelt path will be colour-coded blue. Fasten the seatbelt buckle, remove all slack from the seatbelt and ensure the seatbelt is firm. The carrier can then be fitted to the base in accordance with the restraint manufacturer's instructions.
- For restraints that do not have a separate base, the restraint should be placed at the correct recline angle on the seat according to the restraint manufacturer's instructions, then the seatbelt threaded through the seatbelt path in accordance with the restraint manufacturer's instructions. In restraints manufactured to AS/NZS 1754:2010 onwards, the rearward-facing seatbelt path is colour-coded blue. Fasten the seatbelt buckle, remove all slack from the seatbelt and ensure the seatbelt is firm.
- All rearward-facing child restraints require the use of the top tether strap. At one end of the top tether strap will be the upper anchorage clip which must be attached to the vehicle's child restraint upper anchorage point, and adjusted to remove slack.
- In instances where there are two separate parts to the top tether strap for easy connection, disconnection and removal of the child and/or carrier, refer to the restraint manufacturer's instructions for installation requirements.

2.2.2 Installing forward-facing (Type B and G) restraints

- Forward-facing child restraints must always be installed with a seatbelt and top tether strap.
- Place the restraint in the desired seating position, and thread the seatbelt through the forward-facing seatbelt path in accordance with the restraint manufacturer's instructions. In restraints manufactured to AS/NZS 1754:2010 onwards, the forward-facing seatbelt path is colour-coded yellow. Fasten the seatbelt buckle, remove all slack from the seatbelt and ensure the seatbelt is firm.
- The top tether strap must be attached to the vehicle's child restraint anchorage point, and be adjusted to remove slack.

2.2.3 Installing convertible child restraints: rearward/forward-facing (Type A/B)

- When using convertible rearward/forward-facing restraints, great care must be taken to use the appropriate seatbelt path for rearward-facing mode (marked blue in restraints manufactured to AS/NZS 1754:2010 onwards) and to change the belt path for forward-facing mode (marked yellow in restraints manufactured to AS/NZS 1754:2010 onwards).
- All convertible rearward/forward-facing child restraints are required to have a top tether strap in both modes which must be attached to the vehicle's child restraint anchorage point, and be adjusted to remove slack. The strap must be readjusted when the child restraint is changed from rearward-facing mode to forward-facing mode.

2.2.4 Installing booster seats (Type E and Type F) weighing 2kg or less

- Booster seats weighing 2kg or less are not required to have a top tether strap.
- Place the booster seat on the vehicle seat in the desired seating position.
- Thread the seatbelt through the seatbelt path in accordance with the restraint manufacturer's instructions. In restraints manufactured to AS/NZS 1754:2010 onwards, the booster seat seatbelt path is colour-coded red. Fasten the seatbelt buckle and adjust any seatbelt guides. Remove all slack from the seatbelt.

2.2.5 Installing booster seats (Type E and F) weighing more than 2kg

- All booster seats that weigh 2kg or more must have a top tether strap. The top tether strap secures the restraint to the vehicle, so that the child is not loaded from the back by the booster seat during a frontal crash.
- Place the booster seat on the vehicle seat in the desired seating position.
- Attach the upper anchorage clip to the vehicle's child restraint anchorage point, and adjust the strap to remove any slacks.
- Thread the seatbelt through the seatbelt path in accordance with the restraint manufacturer's instructions. In restraints manufactured to AS/NZS 1754:2010 onwards, the booster seat seatbelt path is colour-coded red. Fasten the seatbelt buckle and adjust any seatbelt guides. Remove all slack from the seatbelt.

2.2.6 Installing convertible restraints: forward-facing/booster seats (Type B/E and B/F)

- When using convertible forward-facing/booster seats, great care must be taken to use the appropriate seatbelt path for forward-facing mode (marked yellow in in restraints manufactured to AS/NZS 1754:2010 onwards), and to change the seatbelt path for booster seat mode (marked red in in restraints manufactured to AS/NZS 1754:2010 onwards).
- All convertible forward-facing restraint/booster seats are also required to have a top tether strap in both modes which must be attached to the vehicle's child restraint anchorage point, and be adjusted to remove slack. The strap must be readjusted when the child restraint is changed from forward-facing mode to booster seat mode.
- Converting from forward-facing mode to booster seat mode (or vice versa) must be performed carefully in accordance with the restraint manufacturer's instructions. The steps include:
  1. Inbuilt harness removal and storage
  2. Locating and, if required, installing belt guides to position the lap-sash seatbelt, or lap-only seatbelt with child safety harness
  3. Threading the lap-sash belt for booster mode
  4. Connection and adjustment of the top tether strap

Figure 2-4:
ISOFIX lower anchorage symbol

Figure 2-5:
Rigid connectors being connected to a vehicle seat.

2.3 Installing ISOFIX compatible child restraints

2.3.1 Overview

It may take many years before all vehicles in Australia have ISOFIX mounting points thus child restraints with ISOFIX attachment connectors must be able to be fitted into vehicles that are not fitted with ISOFIX mounting points.

2.3.2 In a car with ISOFIX mounting point

- The first thing to do is locate the ISOFIX mounting points which are usually at the bottom of the seat where the seat back meets the seat base. If the car has ISOFIX mounting points, the location may be identified by a symbol as shown in Figure 2-4, or the anchorage bars may be visible as shown in Figure 1 16 in the previous module.
- If the restraint has rigid connectors fitted, engage each connector to the corresponding ISOFIX bar on the vehicle as shown in Figure 2-5. Push the child restraint towards the backrest applying a firm and even pressure on both sides. Care should be taken to ensure both sides have been engaged.
- If the restraint comes with flexible connectors, engage the connectors into each ISOFIX low anchorage. A click may be felt and a green indicator will show on the top of the flexible connector when it has engaged. Pull each strap to ensure both lower anchorage connectors are engaged. For more detail follow the instruction provided by the restraint's manufacturer.
- All ISOFIX compatible child restraints also require the use of the top tether strap which must be attached to the vehicle's child restraint anchorage point, and be adjusted to remove slack.
- Australian ISOFIX compatible child restraints are also suitable for use in a seating position not fitted with ISOFIX low anchorages, using the seatbelt and top tether strap as in non-ISOFIX compatible restraints. The rigid connectors on the child restraint can be retracted when used in this way.

2.3.3 In a car without ISOFIX mounting point

Installation of child restraints with ISOFIX connectors in a car without ISOFIX mounting points is the same process as installing a standard child restraint, but ensure the ISOFIX connectors are pushed fully inwards (for rigid connector) or stowed away (for flexible connectors).

2.4 Securing the child in the child restraint

2.4.1 Overview

This section covers the process for restraint fitters in demonstrating to the parent/carer on how to secure the child in the child restraint.

2.4.2 Rearward and forward-facing child restraints

- Firstly, restraint fitters should advise parents and carers how to correctly adjust and tension the harness.
- For rearward-facing restraints (Types A1, A2 and A4), and forward-facing restraints (Type B and G), the child is secured using the inbuilt harness which incorporates a crotch strap.
- It is critical that the appropriate harness slot for the child's shoulder height be used. This needs to be adjusted as the child grows.
- For rearward-facing restraints the shoulder straps must be positioned nearest, but not lower than the child's shoulders. For forward-facing restraints the shoulder straps must be positioned nearest but not lower than 25mm (2.5cm) below the child's shoulder. The use of a slot that is too low can cause high compressive forces on the child's spine, and increase the possibility of the shoulder straps slipping, which can result in the child being ejected from the child restraint in a crash.
- The inbuilt harness must be securely fastened and all slack should be removed. No more than two fingers should be able to fit between the harness and the child when properly adjusted and securely fastened. A loose harness can result in the child being ejected from the child restraint during a crash.
- If the crotch strap is adjustable, this should be adjusted to ensure the buckle is above the genitals and/or pubic bone.
- Some infant restraints are supplied with inserts to support the infant's head and assist with correctly positioning the child's body. Follow the restraint manufacturer's instructions on the use of these accessories.

2.4.3 Booster seats (Type E and Type F)

- In booster seats, the child is restrained by the adult lap-sash seatbelt in which the sash part of the belt is positioned across the child's chest and the lap part of the belt is positioned low across the hip. Most booster seats come with an additional sash belt guide to locate the sash belt on the correct location.
- When placing a child in a booster seat, ensure that the seatbelt path is followed exactly, and care is taken to ensure the seatbelt is located on the correct parts of the child's body.
- The seatbelt must not be positioned under the child's arm or behind the child's back. Incorrect use of the seatbelt dramatically increases the risk of injury to the child's head, abdomen and spine.
- When a sash belt guides is supplied, it must be used in every trip.

2.5 Child restraint fitting accessories

2.5.1 Overview

This section covers common accessories for child restraints that are not supplied with the restraint. It includes child safety harnesses, installation and fitting aids, pillows, padding, wraps, toys and other products designed for comfort or entertainment. Accessories for child restraints are covered by a standard, AS/NZS 8005:2013 *Accessories for child restraints for use in motor vehicles*. However, this standard is not called up in any regulations and these after-market devices are not regulated.

2 Installation and use of child restraints

Child restraints are designed to be installed in most passenger vehicles, without special fitting accessories. Incorrect use of these accessories by parents and carers securing the child in their child restraint can reduce the efficacy of installation and should only be used if necessary. Where they are needed, the restraint user must be instructed in their correct use.

Accessories for child restraints, other than those supplied by the manufacturer and tested with the restraint under either AS/NZS 1754 or AS/NZS 8005 are not recommended. Such accessories can shift and cause slack in the fitting of the restraint to the vehicle as well as securing the child to the restraint and can increase the risk of the child being ejected in a crash.

2.5.2 Reasons why accessories should not be used

The following reasons apply to some specific accessory items that are sometimes used in conjunction with children in child restraints. None of these accessory items are recommended for a variety of reasons.

- **Seatbelt positioners** - several common designs of seatbelt positioners link the sash and lap sections of a seatbelt, raising the lap belt up into the abdomen, and increasing the risk of submarining and abdominal injuries. If children cannot fit well in an adult seatbelt, they should use a booster seat with a lap-sash seatbelt.
- **Buckle covers** and other devices to stop a child from unbuckling a restraint can impede rapid removal of the child in the event of an emergency (e.g. after a crash). Behavioural solutions are preferred.
- **Padding, pillows and cushions** that surround the head or neck, are positioned behind the head, or are within the harness of a restraint may result in harness or seatbelt slack, and/or encourage poor posture and therefore not optimal belt positioning. Pillows behind the head might increase the risk of head injuries in side impacts by pushing the head forward and beyond the side wings of a restraint.
- **Belt tensioners and other fitting accessories** are generally not required for standard installations, and should only be used if recommended by the restraint manufacturer or an experienced child restraint fitter. If used with booster seats or seatbelts, they can lead to injury if over tightened and they may make the seatbelt buckle more difficult to unbuckle in the event of an emergency. When used to install a child restraint, they may deform the restraint, reducing the restraint's strength.
- **Seatbelt extenders** should not be used if the buckle is located in contact with the child's body. They may introduce slack into the belt which could increase the chance of the buckle being located in front of a child's abdomen and causing injury. They can interfere with the correct belt path if used with a booster seat. They also require the parents or carer to check that both the extender buckle and main belt buckle are connected each time, with the possibility that one buckle is left unsecured.
- **Toys and entertainment accessories.** Rigid toys and entertainment accessories may pose a risk of injury if they come in contact with the child in a crash. Also, if not secured, rigid toys may become projectiles in a crash and injure vehicle occupants. Only soft toys that contain no rigid parts should be used unsecured in a vehicle.
- **Chest clips,** designed to prevent the child from removing their arms from the inbuilt harness, pose a strangulation hazard and could injure the child's throat or chest in a crash or the chest. Behavioural solutions to a child slipping their arms out of a harness should be employed.
- **Sun shades or insect nets,** which cover both the child and restraint, may prevent a parent or carer from seeing a child misusing their child restraint or in distress. Such covers may reduce air circulation and result in the overheating of children.

2 Installation and use of child restraints

2.6 Installing old child restraints

When requested to fit an old child restraint or booster seat, restraint fitters should check that:

- It meets AS/NZS 1754, version 2004 or later. Look for this information on the restraint on the standards sticker.
- It has not been involved in a serious crash. It is important to know the full history of the restraint. If a child restraint has been involved in a severe crash i.e. a crash where the vehicle was towed away or any occupants of the vehicle were hospitalised, it must **not be used again** even if no damage is obvious.
- The plastic shell is not damaged. Look for evidence of cracks in the shell and inspect the plastic shell and metal components.
- The harnesses are is not frayed, worn or damaged. Inspect the harness and stitching on the harness.
- The webbing straps aren't twisted and are free from tears and abrasions (see Figure 2-6).
- The quick release buckle works smoothly. Engage and disengage the buckle several times.
- It is not more than 10 years old; and
- All the parts are included.

Restraint fitters must not fit a damaged restraint and should advise the customer to dispose of it in a way that ensures that it cannot be re-used.

Figure 2-6: Undamaged and damaged straps

(a) good strap (b) frayed strap

2.7 Restraint care and maintenance

2.7.1 Overview

This section outlines the guidelines for restraint maintenance and should only be used if the customer requests it. Fitters must not attempt to repair the restraint if they find the restraints are faulty.

2.7.2 Cleaning the cover

All child restraints have flame retardant covers which can be removed for cleaning. Cleaning instructions are usually on the care label attached to the cover.

2.7.3 Cleaning the harness buckle

Spillages on the buckle, such as baby formula, fruit juice, etc., can cause the harness buckle to become sluggish. An indication of a sluggish harness buckle is that you cannot hear a click when engaging the harness tongues. To restore the harness buckle to good working order, follow the details in the restraint's instruction manual.

2.7.4 Cleaning the straps/harness

The strap or harness may be cleaned using a damp sponge. The harness straps can be soaked but must be dried thoroughly without excessive heat (do not tumble dry). The harness straps must not be machine washed as this may cause damage to the stitching.

2.8 Advice to parents and carers

2.8.1 Overview

Below is a brief list of items that restraint fitters should advise parents/carers and demonstrate to help ensure restraints are used correctly and remain correctly installed. It is also important that restraint fitters give parents and carers the knowledge to install their child's restraint correctly and move restraints between vehicles.

2 Installation and use of child restraints

Advise parents and carers to:

- Always use a restraint for every child under seven years old. It is the law that each person in a motor vehicle has their own restraint.
- Choose a restraint:
  - by consulting the information on the CREP website http://www.childcarseats.com.au and choose a restraint with the best rating for both crash protection and ease of use. This will provide the best safety performance and ensure and that is easy to use correctly.
  - that will fit a growing child for the longest time, particularly if the child is of above average height for their age. E.g. consider buying a Type F booster seat rather than a Type E, consider buying an adjustable height booster seat rather than a non-adjustable booster seat with less growing room.
  - If considering a second-hand restraint, do not accept anything that is over 10 years old, has been in a moderate to serious crash, or one that shows any signs of wear and tear to the webbing.
- Keep each child in the restraint as long as they still fit into it. Don't be in a hurry to move them to the next stage restraint and, when using convertible restraints (i.e. those which have two or more modes, e.g. rearward-facing and forward-facing, or forward-facing and booster seat), use the initial mode for as long as possible.
- When choosing seat positions for child passengers, there are a number of considerations depending upon the type of vehicle, presence of airbags, and the number of other children and restraints in the vehicle. Go through the points outlined in section on seating position.
- Regularly check that child restraints are correctly installed and that the restraint is adjusted properly for the child's size according to the restraint user's manual. Recommend using a restraint fitting service when the instructions are not clear or when the parent or carer has attempted to install the restraint and they are not confident with the result.
- Secure unoccupied child restraints to the vehicle. Explain that they can become 'flying objects' in a crash and injure other occupants.

Demonstrate to parents and carers how to identify when a child is ready for the next stage restraint, based on the fit in the particular restraint(s) that are being used.

From rearward-facing to forward-facing restraints

Demonstrate the significance of shoulder height markers, or for older restraints without markers, where the shoulder can come to before the child needs to be moved to the next stage restraint, as appropriate. (See Section 1.5.2 on moving from rearward-facing to forward-facing child restraints).

From forward-facing restraints to booster seats

Demonstrate the significance of shoulder height markers, or for older restraints without markers, where the shoulder can come to before the child needs to be moved to the next stage restraint, as appropriate. (See Section 1.5.2 on moving from forward-facing child restraint to booster seat).

From booster seats to seatbelt

Run through "the 5-step test" to assess if a child is ready to move from a booster seat to a seat. (See Section 1.5.2. on moving from a booster seat to a seatbelt).

Demonstrate to parents and carers how to ensure that all child restraints and booster seats are installed correctly, according to the restraint manufacturer's instructions, by showing them the following:

- The top tether straps and how these should be used for all rearward-facing and forward-facing restraints and booster seats that have them.
- The correct belt path of the seatbelts through the restraint. This may change when restraints that can be used in more than one restraint mode.
- How to pull taut, without any twists or slack, belts and straps that keep the restraint in place in the vehicle. The harnesses in the restraint should be pulled taut without any twists or slack anywhere.
- How to check that the seatbelt is securely fastened before each trip.

Demonstrate to parents and carers how to ensure that child restraints are used correctly every trip, by showing them the following:

- How to identify that inbuilt harness straps in rearward and forward-facing child restraints are adjusted firmly with no slack.
- How to adjust the harness slot in rearward and forward-facing restraints as the child grows.
- How lap-sash belts should be positioned over the child's body, and must not be worn under the child's arm or behind their back whether they are being used alone or with a booster seat.

2.8.2 Further information

Further information on child restraint manufacturers and other useful information is included in Appendix 2.

Appendix 2 – Further information

Child restraint manufacturers

There are several different restraint manufacturers who make many different types of child restraints. The restraints that are available to purchase change frequently. An online list of current makes and models of child restraints is maintained by VicRoads. Visit the 'Child restraint and booster seat product tables' section of the VicRoads website for a list of child restraint and booster seats.

https://www.vicroads.vic.gov.au/safety-and-road-rules/vehicle-safety/child-restraints/child-restraint-product-tables

Contacts for further information

For further information about child passenger safety in NSW, contact Transport for NSW

Phone: 132213 or visit:

http://roadsafety.transport.nsw.gov.au/stayingsafe/children/childcarseats/index.html

See Transport for NSW website for details on authorised fitting stations and their locations.

http://roadsafety.transport.nsw.gov.au/cgi-bin/index.cgi?action=authrestraintfitting.form

Roads and Maritime Services' Vehicle Safety Compliance Certification Scheme (VSCCS)

The VSCCS licenses competent people to inspect significantly modified vehicles and non-standard vehicles, and issue compliance certificates for those that comply with legislated vehicle standards.

http://www.rms.nsw.gov.au/business-industry/examiners/vsccs/index.html

Other useful sources of information

- **The National Guidelines for the safe restraint of children travelling in motor vehicles** provides a very detailed review of a broad range of issues related to child passengers, and a summary of all the relevant scientific evidence (www.neura.edu.au/crs-guidelines). This handbook has been developed to be consistent with these guidelines.
- Kidsafe (www.kidsafe.org.au)

3

Installation of child restraint anchorages

46 A fitter is attaching the top tether strap to the vehicle's child anchorage point

3 Installation of child restraint anchorages

3.1 Scope

This module lays out the processes and procedures for modifying vehicles to install child restraint anchorages in vehicles that do not have suitable anchorages installed at the time of their manufacture.

These procedures shall only be carried out by Tier 1 child restraint fitters (also known as "full fitting services") who are authorised by RMS to modify vehicles in order to install child restraint anchorage points.

Tier 2 fitters ("simple fitting services") must not install those child restraint anchorage points.

3.2 General requirements

3.2.1 Overview

Vehicle safety performance, including the location and performance of child restraint anchorage points, are mandated by the Australian Design Rules (ADRs). Please refer to Section 3.3 for further information on the ADRs which are relevant to child restraint anchorage installation.

The design and safety performance requirements of child restraints are provided by Australian Standard for Child Restraints AS/NZS 1754 *Child Restraints for Use in Motor Vehicles*.

The content of this module is based on procedures developed by Transport for NSW. Parts of the content are covered in Vehicle Standards Bulletin 14 (VSB 14) Section LK6, the National Code of Practice for Light Vehicle Construction, and reports produced by the NSW Government.

Modified vehicles must continue to comply with the vehicle standards requirements of the relevant transport legislation of the Australian State or Territory in which they are registered. Those vehicle standards include the ADRs to which vehicles were originally certified before they could be used in road transport in Australia. Those standards also incorporate the Australian Vehicle Standards Rules (AVSRs) which are national roadworthiness guidelines.

For vehicles manufactured prior to ADRs, modification to provide one or more child restraint anchorages can be provided. However, the modification must ensure that the vehicle seat is not adversely loaded by child restraints in the event of a crash, and must therefore be carefully designed, constructed and installed to ensure they can properly anchor a child restraint during a crash. There are after-market devices available which are designed to provide anchorage points for these vehicles.

Vehicle modifications necessary to install complying child restraint anchorage points require engineering certification issued in accordance with VSB.14. Their installation may affect the vehicle's compliance with the ADRs, and therefore the vehicle's continued compliance with the relevant ADRs (particularly ADR 5/--, ADR 34/--) must be determined.

3.2.2 Anchorage points without pre-installed anchorages

Vehicles that are fitted with child restraint anchorage points without an anchorage fitting installed can have the fitting supplied with the child restraint fitted to these points, in accordance with the restraint manufacturer's instructions.

These fittings are usually supplied with all child restraints that require a top tether. However, after-market replacement anchorage fitting kits are also available.

The child restraint user manual provides instructions for installing these fittings. As this is considered a minor modification, it can be performed by the consumer, with due care, in accordance with the instructions provided by the vehicle manufacturer and by the child restraint manufacturer.

3.2.3 Australian Design Rules

The ADRs set down minimum performance, design and construction standards for particular safety features in vehicles imported to, or manufactured in, Australia. There are over 80 ADRs covering a wide variety of safety requirements, such as occupant restraints, braking systems, lighting systems, tyres and other features to improve occupant protection.

Currently there are two ADR editions in operation:

- The second edition covering vehicles manufactured on or after 1 January 1969 to 30 June 1988; and
- The third edition ADRs apply to vehicles manufactured on or after 1 July 1988.

The application of the various ADRs depends on the vehicle's ADR category.

MA A passenger vehicle with 9 seating positions or less that is not an MB or MC category vehicle.

MB A passenger vehicle with 9 seating positions or less that is not an MC category vehicle, and which has the centre of its steering wheel in the forward quarter of its overall length.

MC A passenger vehicle with 9 seating positions or less that has special features for use off road.

MD A light omnibus or bus which is a passenger vehicle with 10 or more seating positions.

MD1 A bus with a GVM of 3.5t or less that has 12 seating positions or less.

MD2 A bus with a GVM of 3.5t or less that has more than 12 seating positions.

MD3 A bus with a GVM exceeding 3.5 tonnes but not exceeding 4.5 tonnes.

When fitting a child restraint anchorage point to a vehicle, reference should be made to the relevant ADR requirements for that particular vehicle category.

The current ADRs related to child restraint anchorage requirements that motor vehicles must comply with are: ADR 34/02 *Child Restraint Anchorages and Child Restraint Anchor Fittings* and ADR 68/00 *Occupant Protection in Buses*.

ADR 34/02 and ADR 68/00 were adopted to ensure that vehicles equipped with 'Child Restraint Anchorages' and 'Child Restraint Anchor Fittings' were safe for use and suitable for standard 'Attaching Clips'. Compliance with those ADRs will ensure that child restraints may be adequately secured to a vehicle's structure. Table 3-1 summarises the current child restraint anchorage requirements for each vehicle type.

3 Installation of child restraint anchorages

Table 3-1:
ADRs Related to child restraint anchorages

Standard	Requirements
ADR 34/02	This ADR applies to LEP, MA, MB, MC & MD1 category vehicles. Click here to read or download ADR 34/02 or use the following link: http://www.comlaw.gov.au/Details/F2012L00703. The relevant clauses on child restraints anchorages state: **34.3 NOMINATED SEATING POSITIONS FOR UPPER ANCHORAGES** 34.3.2 For MB, MC and MD1 vehicles: 34.3.2.1 For vehicles with less than three seating positions in *Vehicle Rear Seat(s)* each seating position in *Vehicle Rear Seat(s)* equipped with an adult *Seatbelt Assembly*. 34.3.2.2 For vehicles with three or more seating positions in *Vehicle Rear Seat(s)* any three seating positions in *Vehicle Rear Seat(s)* equipped with an adult *Seatbelt Assembly* except for *Folding Seats* where a *Child Restraint* would bar access to the rear *Seats* and except the middle seating position where the *Seat* back is divided into two or more sections which may be folded independently of each other, and the division between two sections lies substantially along the *Seating Reference Plane* of the middle seating position. MA category vehicles with rear seating positions must be provided with a child restraint anchorage location for each of these positions unless the seat has a split for folding in the centre of the seat. (see note below). Specifically: 'An upper anchorage for use with a child restraint system is provided for each rear seating position.' **Notes:** a) At least 3 child restraint anchorages are required if there are 3 or more rear seating positions. b) A child restraint anchorage point is not required on the centre seat of a split folding rear seat. c) Optional ISOFIX low anchorages are specified in ADR 34/02 (clause 34.8) and these are required to be accompanied by an upper anchorage for use with an ISOFIX compatible child restraint, (i.e. one certified to AS/NZS 1754:2013).
ADR 68/00	This ADR applies to MD3 category vehicles. Click here to read or download ADR 68/00 or use the following link: http://www.comlaw.gov.au/Details/F2006L01454. The relevant clauses on child restraints anchorages state: 5.6.1 At least six *'Seats'* in the vehicle must be provided with *'Child Restraint Anchor Fittings'* or, at the *'Manufacturer's'* option, *'Child Restraint Anchorages'* and *'Child Restraint Anchor Fittings'* meeting the requirements specified in ADR 34/--. 5.6.2 Each 'Seat' provided with a *'Child Restraint Anchor Fitting'* must be provided with a means of preventing the *'Child Restraint Anchorage'* tether strap from moving sideways. 5.6.3 Each *'Child Restraint Anchor Fitting'* must be either integral with the *'Seat'* or mounted in a permanent structure immediately behind the *'Seat'*. 5.6.4 Each *'Child Restraint Anchor Fitting'* applicable to a *'Seat'* tested according to clause 7 or Appendix 2 must be present during those tests with any closure plugs removed and with a *'Child Restraint Attaching Clip'* attached. 5.6.5 A *'Child Restraint Anchor Fitting'*, with any closure plugs removed and with a *'Child Restraint Attaching Clip'* attached must be treated as an accessory and must meet the requirements of clause 6.

Notes:

- MD1 category vehicles must have at least 3 child restraint anchorages, if there are 3 or more rear seating positions;
- A child restraint anchorage point is not required on the centre seat of a split folding rear seat if the fold is in the centre of the seating position.

- Each anchorage point must be suitable for a 5/16¨ 18 UNC bolt.

3.2.4 Vehicle Standards Information

Vehicle Standards Bulletins (VSBs) are nationally accepted specifications published by the Commonwealth Government's Department of Infrastructure and Regional Development (DIRD). They provide detailed technical information on safety-related vehicle modifications. Additionally, some states and territories issue state-specific vehicle safety information publications. Restraint fitters should check these publications for the latest information on vehicle standards and modifications.

Click here to read or download copies of the VSBs from the DIRD website, or use the following link: http://www.infrastructure.gov.au/roads/vehicle_regulation/bulletin/index.aspx

Click here to read or download copies of the NSW specific safety information publications from the Roads and Maritime Services (RMS) website, or use the following link: http://www.rms.nsw.gov.au/registration/downloads/vsi/vsi_dl1.html

3.3 Installing child restraint anchorages to pre-ADR vehicles and those not required to have them

3.3.1 Overview

Vehicles manufactured prior to the implementation of the second edition of ADR in 1 January 1969 (pre-ADR vehicles) were not required to be fitted with child restraint anchorage points.

All goods vehicles such as panel vans and utility vehicles are also not required to have child restraint anchorage points. These vehicles can usually be modified to provide one or more child restraint anchorage points but they must be installed in the appropriate position to ensure that the vehicle seat is not adversely loaded by the child and the child restraint in the event of a crash.

In addition, the anchor point must have adequate strength to withstand the forces generated during a crash and thus, with the child restraint, offer maximum protection to the child in the event of a crash.

In pre-ADR vehicles anchorage points must not be installed in the floor behind a seat unless engineering certification verifies that the seat complies with the requirements of ADRs 3/03, 4/05 and 5/05, otherwise the loads imposed on the seat by the tether strap may cause the seat to fail.

The following is the list of after-market devices which are designed for this purpose:

- Anchorage kit for parcel shelf of a sedan
- Child Restraint Anchor Bar (CRAB)
- Vertical Post
- Universal Frame
- Dual Cab Device
- Anchorage kit for Toyota Commuter buses

The following sections outline the minimum requirements for the installation of each of these options.

3.3.2 Rear parcel shelf mounted anchorage points

Child restraint anchorages may be installed in the parcel shelves of pre-ADR 34 passenger cars by using a standard anchor bracket and anchor bolt kit. **Do not install child restraint anchorages if the shelf is not made of metal.** Installation of the kit requires a 9mm diameter hole to be drilled in the rear parcel shelf. It is essential that the hole is:

- drilled through a substantially flat metal section that is structurally sound and rust free
- located more than 50mm from any existing hole in the metal
- located within 40mm of the longitudinal centreline of the seating position (see Figure 3-1)
- located in a position that allows for the top tether strap to be easily adjusted as well as the easy engagement and disengagement of the anchorage fitting to the anchor bolt.

All components of the anchor bolt kit should be used; the spreader plate washer must be fitted to bear on a flat surface on the underside of the parcel shelf. A range of spacers and spreader plates are available for parcel-shelf installations (see Figure 3-2, Figure 3-3 and Figure 3-4).

3 Installation of child restraint anchorages

Figure 3-1:
Typical Child Restraint Anchorage locations.

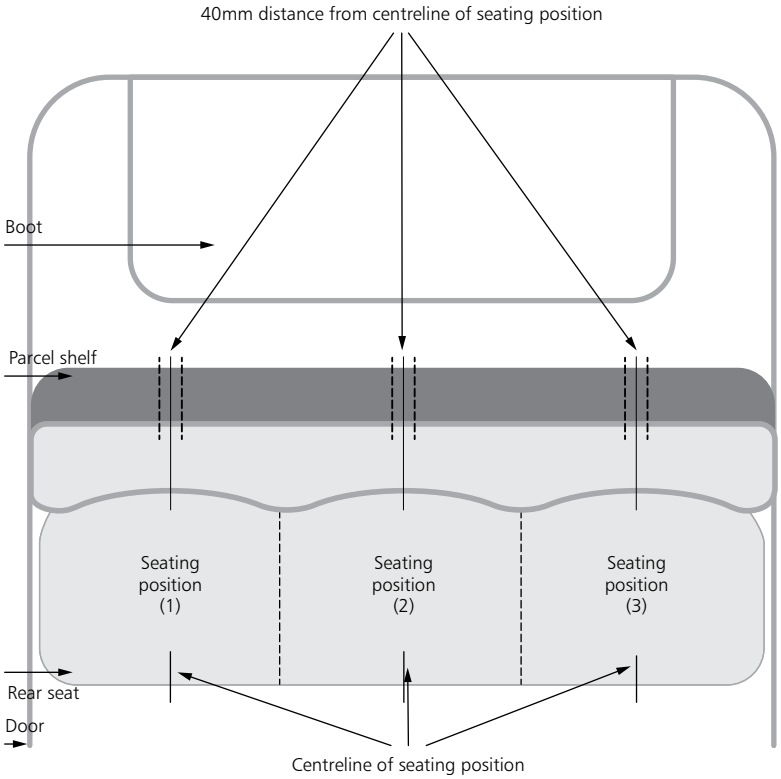


Figure 3-2:
Anchor fitting strap to straddle speaker holes (suitable for pre-ADR vehicles).

Figure 3-3:
Range of parcel shelf spacers (square spacers can be used for Toyota Tarago – between the trim and the body panel – when fitting CRAB).

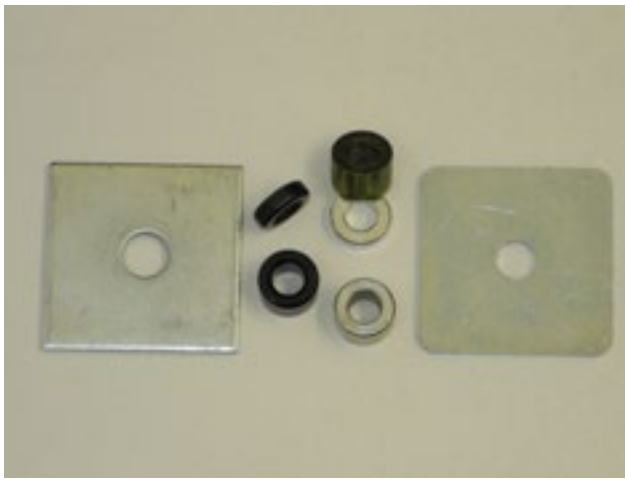


Figure 3-4:
Range of spreader plates used for various applications (5/16" UNC thread used for child restraint anchor fittings and 7/16" UNF thread used for seatbelts and CRAB installations).

3 Installation of child restraint anchorages

3.3.3 Child Restraint Anchorage Bar

A Child Restraint Anchorage Bar (CRAB) is commonly installed in vehicles that do not have rear parcel shelves such as station wagons, four wheel drive and forward control passenger vehicles.

A CRAB device has a wall thickness of 2.0mm and consists of a main tube (with an outside diameter of 48.4mm) that is designed to slide over an inner and smaller tube (with an outside diameter of 42.5mm) to adjust the CRAB for varying widths between its proposed mounting points.

The CRAB (see Figure 3-5) can incorporate anchorage points for up to three children, with a maximum mass of up to 32.5kg each, including the mass of their restraint.

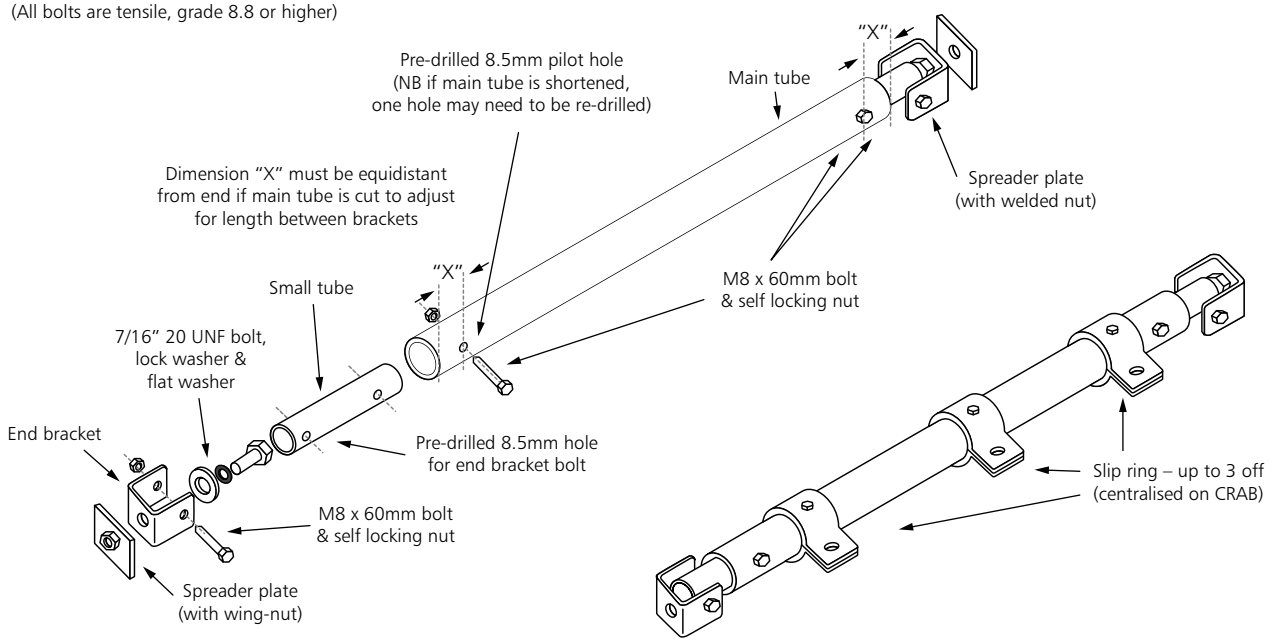
CRABs are currently available in two telescopic sizes to suit the width of the vehicle to which they will be fitted – one for small to medium sized vehicles measuring 1250mm to 1460mm between the proposed mounting points, and one for larger vehicles measuring 1460mm to 1600mm between those points.

To suit smaller vehicles, the 1250mm to 1460mm CRAB can be shortened by cutting the Main Tube to the required length and drilling a new pilot hole at the cut end of the Tube (see Figure 3-5).

The amount of metal removed from the Main Tube must not exceed, by more than 100mm, the difference between 1250mm and the distance between the proposed CRAB mounting points.

Once the length of the Main Tube has been adjusted, a new 8.5mm pilot hole may be required at the cut end of the Main Tube. If this is the case, drill a new 8.5mm pilot hole at the same distance from the cut end and in the same plane as the pilot hole from the uncut end of the tube.

Figure 3-5:
Child Restraint Anchorage Bar (CRAB)



3 Installation of child restraint anchorages

Figure 3-6:
CRAB Location Relative to Seat Back

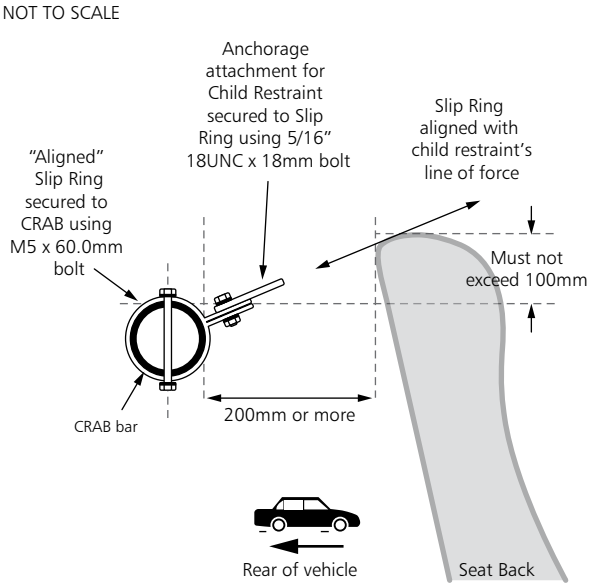
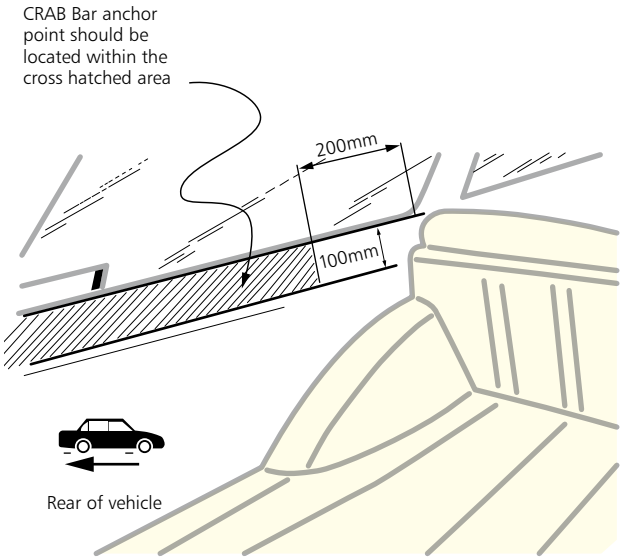


Figure 3-7:
Typical CRAB location



The CRAB unit must be installed in accordance with its manufacturer's instructions. In case the instruction is missing, a copy is provided in Appendix 3-A1 with some editorial changes.

The CRAB unit must be fitted not less than 200mm behind and not more than 100mm below the top rear edge of the seat back. The attached slip rings must be suitable for use with a 5/16" 18 UNC bolt to secure the child anchorage attachment and must also be aligned so that the force lines are parallel to the child restraint load lines to minimise seat back loading as shown in Figure 3-6.

To satisfy this requirement, it is recommended that the CRAB mounting points are installed at waist rail height in the cross hatched area shown in Figure 3-7.

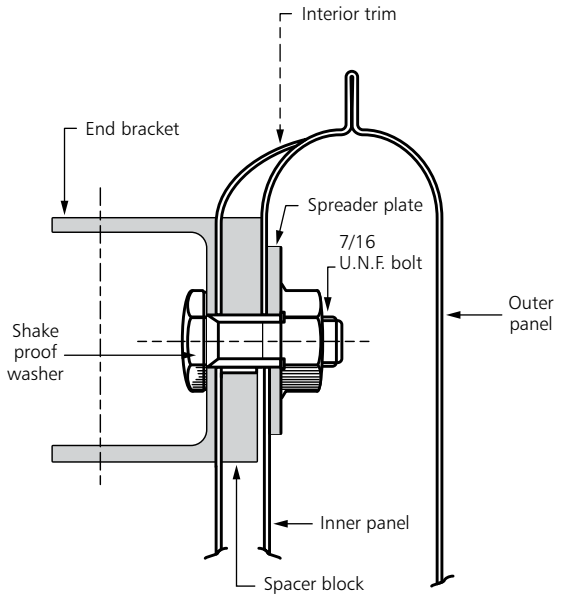
There must be sufficient clearance between the inner and outer body panels to allow the 7/16" 20 UNF mounting bolts to be installed without them fouling the outer panels.

The inner panel supporting the CRAB end brackets must be 0.7mm thick or thicker.

The spreader plate must measure at least 65.0mm X 34.0mm X 3.0mm and have a flat surface on which to bear when positioned behind the vehicle's inner panel. Failure to do this will result in distortion of the panel, which may lead to failure of the anchorage system in the event of a crash.

Drill a 12mm hole through the inner body panel and install the end bracket (and spacer block if required) and spreader plate using 7/16" 20 UNF bolt (refer to Figure 3-8).

Figure 3-8:
Cross section view of vehicle's inner panel showing a typical CRAB attachment.



3 Installation of child restraint anchorages

Unless supported by an engineering report, the CRAB must not be used in vehicles with aluminium or composite body panels. For these vehicles, a Vertical Post may be a suitable alternative.

3.3.4 Child restraint anchorage bar installation in panel vans and station wagons

A mounting position is usually located behind the rear seat, in the waist-rail (see Figure 3-9 below), but can be positioned elsewhere where there is sufficient body material to allow a firm mounting. In these situations, the suitability of the desired location should be confirmed with the manager of the RMS Authorised Restraint Fitting Station Scheme. The CRAB must be located so that the child restraint anchorage points are **not less than 200mm behind the top rear edge of the seat back and not more than 100mm below the top of the seat back,** as shown in Figure 3-6 above. This latter requirement is specified in the ADRs, and is applied to ensure only minimal additional loads are applied to the seat back.

In vehicles with three or more rows of seats, CRABs cannot be mounted behind middle row seats where they may become a hazard to occupants sitting behind in third row seats.

3.3.4.1 Suitable Vehicles

There is no specific vehicle make and model listed in this manual but authorised fitters are required to measure the thickness of the vehicle's rear inner panel before starting the work. If the thickness of the inner panel is less than 0.7 mm, CRAB **MUST NOT** be installed in the vehicle. The CRAB must not also be installed in vehicles with aluminium body panels or with soft tops.

Figure 3-9: CRAB fitted in an Econovan

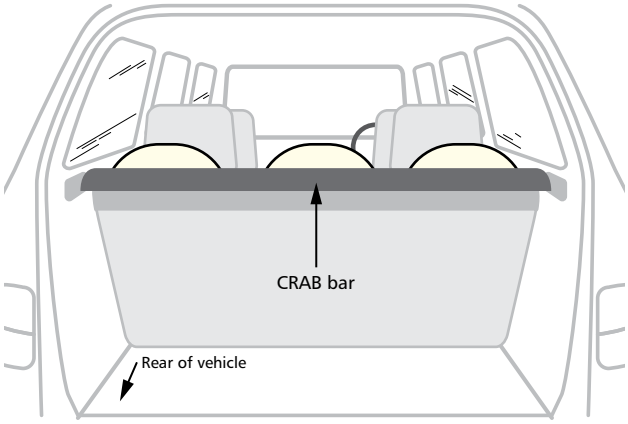
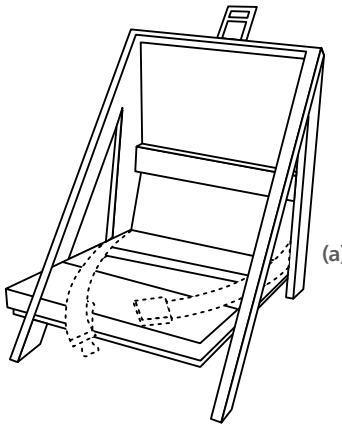


Figure 3-10: Universal Frame



(a) Universal frame

(b) Universal frame with child car seat fitted

3 Installation of child restraint anchorages

Engineering certification is not required if CRAB is fitted to vehicles where the thickness of the vehicle's rear inner panel is at least 0.7mm.

3.3.5 Universal Frame

3.3.5.1 Overview

A Universal Frame (refer to Figure 3-10) has been developed for use in panel vans and station wagons to accommodate child seats where there are no passenger seats fitted.

While it has been designed for installation in the rear of vehicles with a single steel floor pan, it may be possible to install a Universal Frame in vehicles with raised false floors, provided the cavity between the false floor and floor pan can be accessed.

The Universal Frame:

- Must be installed in accordance with the manufacturer's fitting instructions and must not be modified in any way (in case the instruction is missing, a copy is provided in Appendix 3-A2 with some editorial changes).
- Should be positioned as close as possible behind the front seats to ensure good access to the child restraint and the child while in the seat, but allow sufficient space for the child's legs and feet between the vehicle seats and the frame.
- Must be installed in the forward-facing position.
- Must be secured using high tensile bolts with suitable locking devices such as shake-proof washers.

3.3.5.2 Suitable Vehicles

There is no specific vehicle make and model listed for this device but authorised fitters are required to measure the thickness of the vehicle's floor pan before starting the work. If the thickness of the floor pan is less than 1.2 mm, the Universal Frame **must not** be installed in the vehicle.

Engineering certification is not required if the Universal Frame is fitted to vehicles where the thickness of the vehicle's floor pan is at least 1.2 mm.

3.3.6 Techsafe post and Pedestal bar

3.3.6.1 Overview

The Techsafe post and Pedestal bar are post type anchorage points where both were originally designed to provide anchorage points in pre 1 July 1990 Range Rovers. These devices were developed because CRAB is not suitable for the Range Rovers since it its inner panels are made of aluminium.

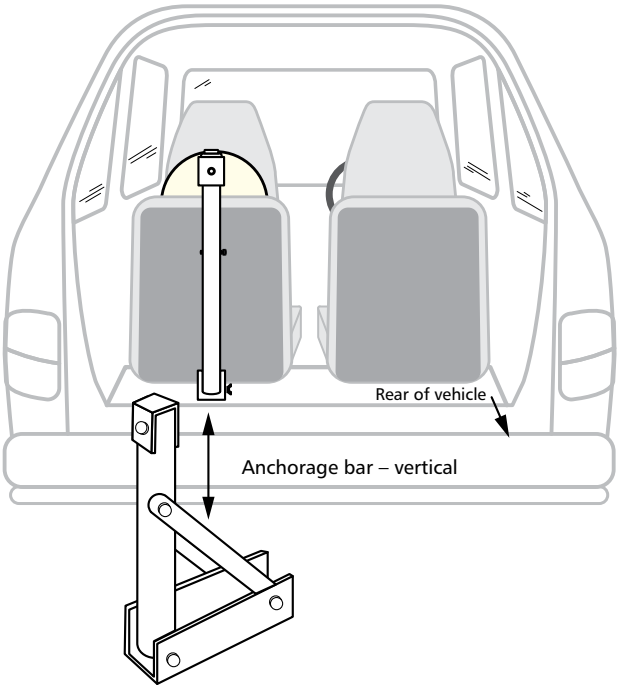
The Techsafe post can be folded down when it is not in use. However, the Pedestal Bar is permanent and does not fold down. Each Techsafe post or Pedestal bar provides only one anchorage point. An example of the Techsafe post is shown in Figure 3-11a and the Pedestal bar is in Figure 3-11b.

Figure 3-11:
Examples of Techsafe post (left) and Pedestal bar (right)

(a) Post

(b) Pedestal bar

Figure 3-12:
Techsafe post fitted in a Suzuki Vitara



3 Installation of child restraint anchorages

An example of Techsafe post when fitted in Suzuki Vitara is shown in Figure 3-12.

Both devices must be mounted on a solid section of the floor. Do not mount them on a removable or timber section. They must not be mounted on the floor panel over the fuel tank in a Ford Falcon panel van.

The general fitting instructions for these devices are:

- Both devices must be installed in accordance with the manufacturer's instructions. In case the instruction is missing, a copy is provided in Appendix 3-A3 and 3-A4 with some editorial changes.
- Under no circumstances is either item of equipment to be modified.
- The centreline of the post must lie within 40mm of the longitudinal centreline of the child restraint when fitted in the required seating position.
- Load spreader plates must be used in all applications.
- For vehicles with corrugated floors, the base channel must be positioned so that holes are drilled through the middle of the vee. Spacers must be used to fill the depth of the vee (see Figure 3-13).

3.3.6.2 List of Vehicles

Both Techsafe post and Pedestal bar are originally designed to provide anchorage points in pre 1990 Range Rovers where the thickness of the floor pan was approximately 1.2 mm. Both devices are allowed to be fitted in other vehicles providing the vehicle's floor pan thickness is at least 1.2 mm.

3.3.7 Installing child restraint anchorages in dual cab utility vehicles

3.3.7.1 Overview

Child restraint anchorages may be provided in twin cab or dual cab utility vehicles which do not have factory-installed child restraint anchorage points.

There are two common products available for providing child restraint anchorage points in these types of vehicles: the Dual Cab Device (DCD) and the Dual Cab Anchorage (DCA).

3.3.7.2 Dual Cab Device (DCD)

The DCD comprises a strap that passes through a `D' ring mounted just below the rear window and then attaches to the floor of the vehicle. An example of this device is shown in Figure 3-14a and when it is fitted to the vehicle in Figure 3-14b.

Figure 3-13:
Typical attachment on vehicles with corrugated floor.

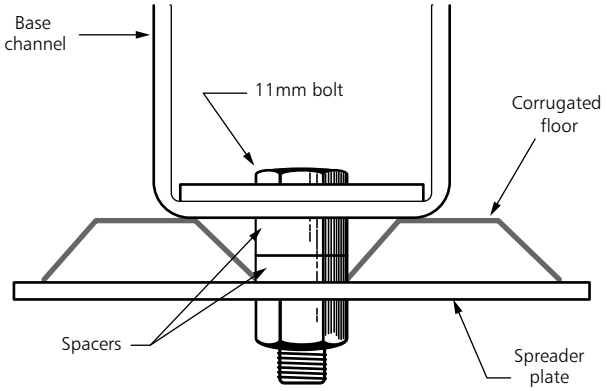
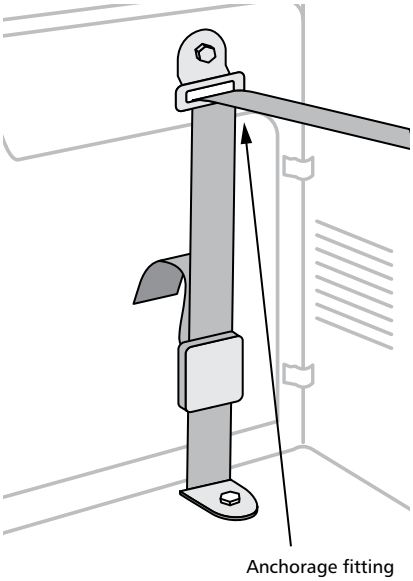


Figure 3-14:
Dual Cab Device

(a) Dual Cab Device with flexible strap

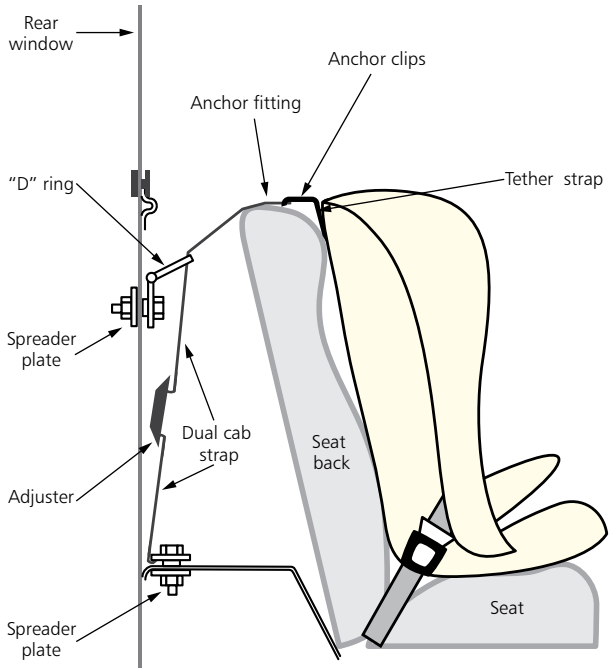


(b) Dual Cab Device when fitted to a utility vehicle

Things to look for when using this device

- If there is not enough adjustment for the top strap of the baby capsule after fitting the device, use a gated buckle on both sides of the top tether strap to shorten it. (See Figure 3-15).
- In some twin cabs there is very little room between the cab and the tray but the recess just under the tray top should allow enough room for the spreader plate with nut.
- To adjust the dual cab strap, unbuckle the seat belt, lift the child seat up to the roof of the vehicle and fold the seal back forward under the child seat. This should allow enough room to adjust the strap.
- In some convertible restraints, because the top tether cannot shorten enough, you may have to put the snap hook down through the "D" ring and then attach it to the DCD.
- The DCD must be installed in accordance with the manufacturer's instructions. In case the instruction is missing, a copy is provided in Appendix 3-A5 with some editorial changes.

Figure 3-15:
Installation diagrams for DCD



3.3.7.3 Dual Cab Anchorage (DCA)

The DCA, as illustrated in Figure 3-16, is fitted at the rear window of the vehicle's cab. Although it was originally developed for a Holden Rodeo, this device has been adapted to suit other vehicles including the Nissan 720, Nissan Navara, Mitsubishi Triton, and Toyota Hilux 1984 onwards. Please refer to the full list of vehicles this device can be fitted to at the end of this section.

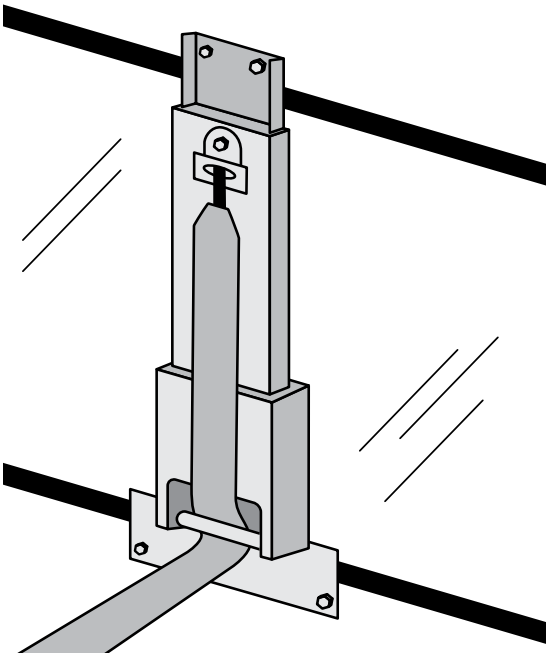
An example of DCA device when fitted in a utility vehicle is shown in Figure 3-17.

Note: Only a DCA permanently marked with an approval number and a RMS licensed certifier's certificate number can be used.

The DCA must be installed in accordance with the manufacturer's instructions. In case the instruction is missing, a copy is provided in Appendix 3-A6 with some editorial changes.

Figure 3-16:
Dual Cab Anchorage Device kit and cover.

Figure 3-17:
Showing DCA fitted to a utility vehicle



3.3.7.4 Suitable Vehicles

Engineering certification is not required if both the Dual Cab Device and the Dual Cab Anchorage is fitted to the following vehicles:

- Mitsubishi Triton – MJ, manufactured approximately from 1992 to 1996 with Compliance Plate Approval (CPA) No 9639.
- Nissan Navara – D22, manufactured approximately from 1997 to 2012 with CPA No 11821.
- Toyota Hilux – 140 series, manufactured approximately from 1997 to 2005 with CPA No 12126.
- Toyota Hilux – 145 series, manufactured approximately from 1997 to 2005 with CPA No 13262.
- Ford Courier – PE, PG, & PH, manufactured approximately from 1999 to 2006 with CPA No 13283.
- Holden Rodeo – R9, manufactured approximately from 1998 to 2002 with CPA Nos: 12555 and 12556.

Installation of a DCD and DCA in a vehicle not listed above must be certified by a Licensed Certifier authorised under the RMS Vehicle Safety and Compliance Certification Scheme.

3.3.8 Installing child restraint anchorages in Toyota Commuter buses

The Toyota Commuter 200 series vehicle is classified in ADR as a MD2 vehicle where it is not required to be fitted with a child restraint anchorage. A specifically designed child restraint anchorage kit model number A176 to suit Toyota Commuter 200 series vehicles has been developed to allow children to be transported in this vehicle model. The kit consists of an anchorage bracket and two sets of 6mm x 35mm 12-9 high tensile graded bolts. An example of this kit is shown in Figure 3-18.

The A176 child restraint anchorage bracket must only be fitted in inboard seating positions where the upper seat belt anchorage is located on the seat back structure.

Figure 3-18:
Installation bracket for Toyota Commuter (2005 onwards), model A176, and as installed.

Note: Tests done by Transport for NSW on the device found that when it is fitted in seating positions where the upper seat belt anchorage is located on the vehicle structure, the seat arrangement failed the requirements of ADR 34. But when it was fitted in inboard position where the upper seat belt anchorage is located on the seat back structure, the seat met ADR 34 requirements.

Do not install the bracket in the outboard rear seating positions where the upper seat belt anchorage is located on the vehicle structure. Anchorages must be fitted by an Authorised Fitter. This device allows for up to 3 anchorages per vehicle. The upper anchorage strap (child restraint tether) fits under the hand grab. See Figure 3-18 above.

These fitting Instructions are for child restraint anchor points into the single and double fixed base seats only. These instructions are not suitable for rearmost or side fold up seats.

The bracket must be installed in accordance with the manufacturer's instructions. In case the instruction is missing, a copy is provided in Appendix 3-A7 with some editorial changes.

3 Installation of child restraint anchorages

3.4 Contact information for enquiries

Enquires on installation of child restraint anchorage can be addressed to:

Crashlab
409 Great Western Highway, Huntingwood, NSW
Phone (02) 9830 1710
Fax: (02) 9830 1781
email: crashlab.enquiries@rms.nsw.gov.au

or RMS' appointed agent:

Mobility Engineering
4/45 Salisbury Road, Asquith, NSW 2077
Phone: (02) 9482 4572
Fax: (02) 9482 4571
email: sales@mobilityengineering.com.au

3.5 Further Information

Fitters undertaking vehicle modifications must familiarise themselves with the relevant Australian Design Rules and the state regulations that apply. Further details are in the sections above. Some helpful links include:

ADRs:

ADR 34 (Child Restraint Anchorages and Child Restraint Anchor Fittings)

ADR 68 (Occupant Protection in Buses)

Australian government's Vehicle Standards Bulletins can be found at:

http://www.infrastructure.gov.au/roads/vehicle_regulation/bulletin/index.aspx

NSW Vehicle Standards information is available from:

http://www.rms.nsw.gov.au/roads/safety-rules/vehicle-standards/information-sheets-specifications.html

Appendix 3-A. Installation instructions

3-A1 Child Restraint Anchorage Bar

Below is the installation instruction for Child Restraint Anchorage Bar copied from the product's manufacturer with some editorial changes:

1. Select a mounting location for each CRAB end bracket by referring to Figure 3-6 and Figure 3-7.
2. Ensure that each inner panel at that location is not less than 0.7mm thick.
3. Ensure that each inner panel at that location will provide the CRAB end bracket spreader plate with a flat surface on which to bear when positioned behind the panel. Failure to do this will result in distortion of the panel, which may lead to failure of the anchorage system in the event of a crash.
4. Ensure that there is sufficient clearance between the inner and outer panels for the 7/16" 20 UNF mounting bolts to be installed without them fouling the outer panel.
5. Remove any trim that is covering the waist rail or restricting access to the body cavity. Sometimes access for installing spreader plates can be improved by removing a tail light cluster or air vent.
6. Using one of the spreader plates (to check that the panel is flat), mark the location of the end bracket mounting hole(s).
7. If the trim will cover the proposed mounting point, replace the trim and remark the location of the mounting hole on the trim. Remove the trim and cut a hole in it at the marked location using a 12mm diameter hole saw. A hole saw usually makes a neater cut in trim if the drill is put in reverse.
8. Drill the inner panel, using an 11.5mm (7/16") sheet metal drill. To avoid damaging the outer panel during this operation, a depth gauge or sheet metal drill should be used.
9. Replace the trim.
10. Mount the end bracket, spacer block (if the trim is too thick or spongy), and spreader plate, using the 7/16" 20 UNF bolt provided (Figure 3-8). In some cases, it may be necessary to secure the spreader plate to the body panel to ensure it remains correctly aligned during the tightening procedure. A 'PK' screw or pop rivet is adequate for this purpose or it may be necessary to weld a piece of wire to the spreader plate to help in positioning it.

11. Tighten the bolt, making sure the spreader plate is correctly aligned (Figure 3-8).
12. Repeat the previous steps for each end bracket.
13. Fit the slip ring(s) to the CRAB unit.
14. Assemble the CRAB unit by sliding the short inner tubes into each end of the main tube with the drilled ends protruding (Figure 3-5). If possible, align the end brackets parallel to the vehicle floor as shown in Figure 3-9, unless they are mounted on an angled surface and can be positioned so that they will work as a universal joint.
15. Attach the CRAB inner tubes to the end brackets using the M8x60mm bolt and self-locking nuts provided (Figure 3-5). Do not tighten these bolts at this point.
16. Centralise the CRAB main tube and drill an 8.5mm hole completely through both End Tubes, parallel to the vehicle floor, using the pilot holes in the Main Tube as a guide.
17. Fit the M8x60mm bolts and self-locking nuts provided and tighten, to secure the CRAB unit to each end bracket.
18. Position the slip ring(s) so that each Child Anchorage is parallel to the anchorage strap or top tether strap (i.e. so that the load is in a straight line) and aligned with the centre of the respective seating position.
19. With each slip ring properly located, drill a 5.5mm hole through the slip ring and CRAB.
20. Secure each slip ring to the CRAB unit, using a M5x60mm bolt and self-locking nut, to prevent it sliding and being displaced in the event of a crash.
21. Fit and tighten the child restraint anchorage fitting(s).

A CRAB device must not be extended or modified, other than as noted above for small vehicles.

Use only high tensile bolts of Grade 8.8 or higher or Aluminium/steel rivets of Grade 5.056 or higher.

3-A2 Universal Frame

Below is the instruction manual copied from the product's manufacturer with some editorial changes:

- Inspect the surface on which the frame is to be mounted to ensure that it is all steel construction and that the underside is free of obstructions that may hinder the correct installation of the frame.
- Position the frame as shown in Figure 3-19 to ensure good access to the child restraint and the occupant, while ensuring sufficient space between the vehicle seat(s) and the frame for the child's legs and feet.
- Check under the floor for access and for room for the spreader plates to run across the vehicle.

Figure 3-19:
Positioning of Child Restraint Frame behind the vehicle's seat.

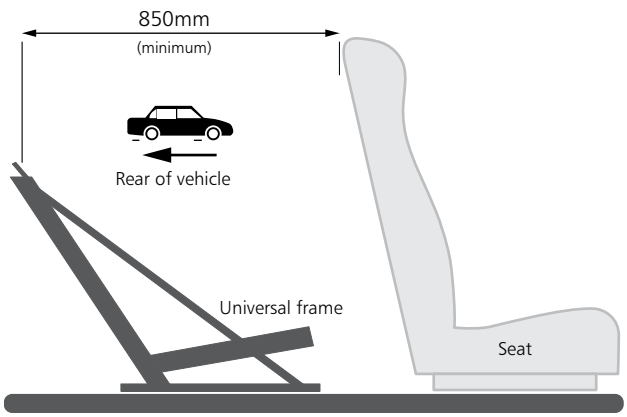
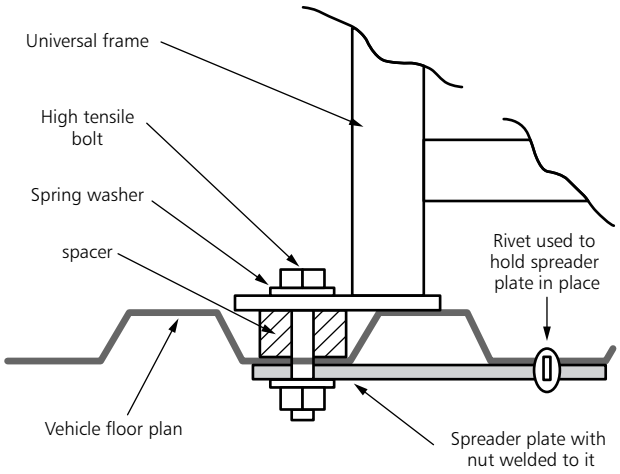


Figure 3-20:
Universal Frame Attachment



- Mark out the anchorage points for the frame using the frame as a template ensuring that the anchorage bolt spreader plates clamp against a flat surface. If the floor-pan is made of corrugated steel, suitable spreader plates and spacers must be used to fill in the depth of the "V" (vee) (see Figure 3-20).

Drill four 10 mm holes and position and secure the frame using the bolts and spreader plates provided. (Note: if necessary, the spreader plates may be kept in position by riveting them onto the floor so they cannot drop off if the frame is temporarily removed from the vehicle).

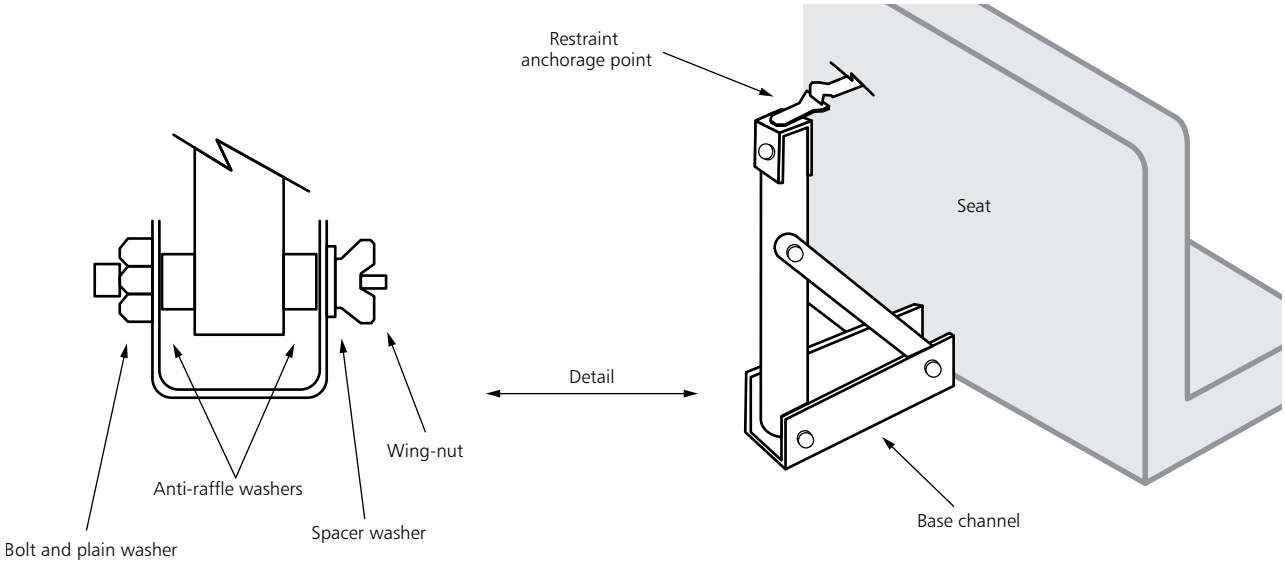
If necessary, the spreader plates may be cut to avoid obstacles such as "top-hat" sections. However, ensure that the spreader plate is not shorter than 100 mm at either end. The modified plate should be riveted to ensure that it does not work loose or rotate when tightening the anchor bolt.

3-A3 Techsafe post

Below is the instruction manual copied from the product's manufacturer with some editorial changes:

- Place the child restraint in the seat position and fasten the adult belt. Pass the top tether strap over the seat and allow it to hang clear of the floor. Mark the floor directly under the centre of the strap and use this to mark a line rearwards parallel to vehicle centreline.
- Assemble the Techsafe post as illustrated in Figure 3-21 and place it along the line marked as above (1) with the hole in the base channel to the rear of the vehicle using the dimensions in Figure 3-22. Position the Post so that the anchorage point on top is located approximately 250mm rearwards of the seat back. For Range Rovers only, position the anchorage point exactly 176mm rearward of the seat belt lower anchorages.
- Mark the floor through the hole in the base channel to determine the location of 11mm diameter hole to be drilled in the vehicle floor (For Range Rovers, 11mm diameter hole must pass directly through the centre of the underfloor cross member).
- Measure 215mm +/ - 15mm from 11mm diameter hole along the base channel to locate the position of the 8mm diameter hole to be drilled in the channel and the floor.
- Note: Before drilling the floor and channel.
- Check to ensure there is sufficient clearance on the underside of the floor for fitting the spreader plates.
- For corrugated floors, the base channel must be positioned so that the hole is drilled through the middle of vee and spacers used to fill depth of vee.
- As a result of these checks, the base channel may need slight relocation and the distance between the 11mm and 8mm holes may have to be altered. The channel must still be positioned parallel to the vehicle centreline with the anchorage point located approximately 250mm behind the seat back.
- Mark the hole positions as determined in step (4) and drill the holes.

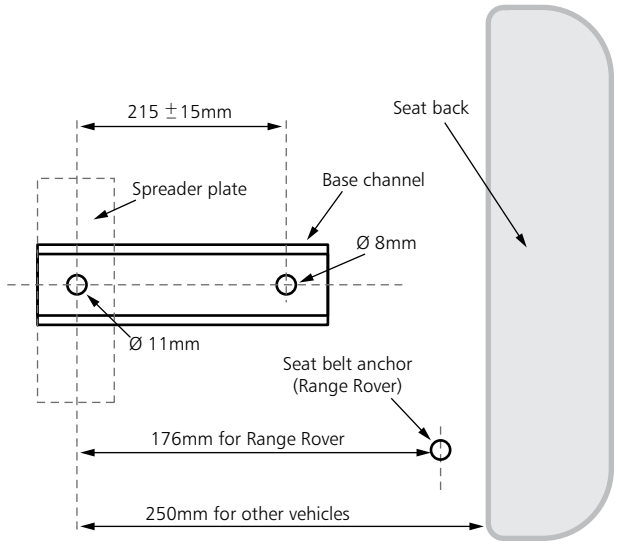
Figure 3-21:
Restraint anchorage post



3 Installation of child restraint anchorages

- Securely bolt the base channel member only to the floor ensuring equal size spacers are used on both mountings (where necessary) and the square reinforcement plate is placed under the head of 11mm bolt. Note the positioning of the spreader plate under the floor (Figure 3-22). For Range Rovers, use a smaller spreader plate to fit into under floor cross member.
- Assemble the anchorage post as illustrated in Figure 3-21, ensuring all washers are fitted correctly as shown in Figure 3-23 and noting that the three holes are provided in the base channel for final positioning of the anchorage point.
- Attach the anchorage bolt and clip to the anchorage point and attach the child restraint and adjust the tether strap to secure the seat.

Figure 3-22:
Restraint anchorage post relative to seat back, top view.



- The vertical post may be reduced in height to suit seat back heights less than 640mm. However, under no circumstances must the anchorage point be more than 100mm below the top of the seat back.

3-A4 Pedestal bar

Below is the instruction manual copied from the product's manufacturer with some editorial changes:

1. Cut the Pedestal Bar to a length of 500mm and fit the plastic plug rivet belt guide.
2. Position the pedestal bar 215mm from the back seat at floor level (Figure 3-24) and centre the hole over the troughs in the floor.
3. Use the pedestal bar as a guide and drill a pilot hole through the floor lining and floor.
4. Check from underneath the vehicle and ensure the hole is 30 mm behind the floor cross member.
5. Take both holes out to 8mm.
6. Lower the fuel tank on the front mounting without totally removing the nuts – use a 9/16" spanner.

Figure 3-23:
Restraint anchorage post, side view.

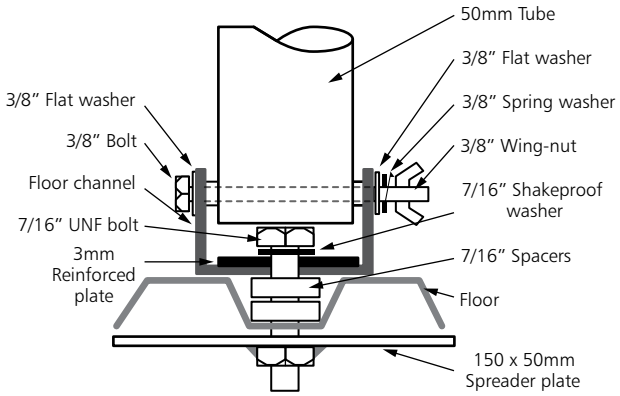


Figure 3-24:
The distance between the pedestal bar and the back of the seat.

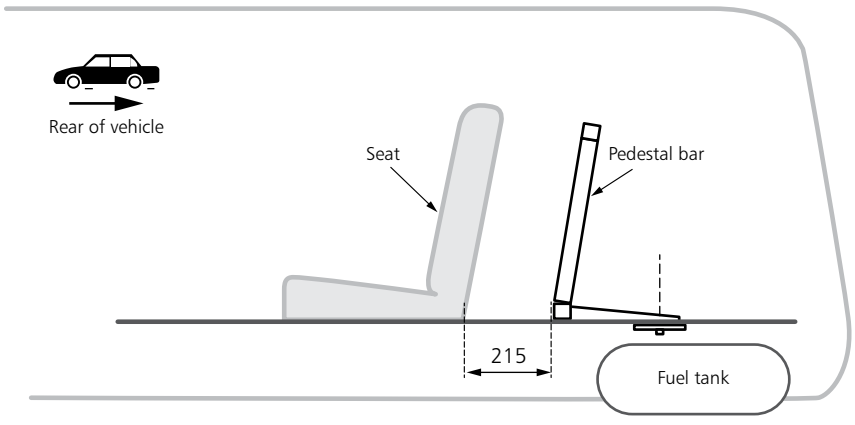


Figure 3-25:
Hole Saw

7. Slide in the spreader plate over the fuel tank.
8. Fit the bolts and gently tighten them.
9. Install the mounting plate securing rivets.
10. Remove the bolts and Pedestal Bar and cut out the floor lining using a hole saw as shown in Figure 3-25. Fit the 20mm spacers. Refit the Pedestal Bar and bolts. Retighten the fuel tank mount.

3-A5 Dual Cab Device

Below is the instruction manual copied from the product's manufacturer with some editorial changes:

- This device must only be fitted where there is nothing obstructing the spreader plate position, (e.g. fuel tank/lines, brake lines, electrical wires or chassis rails).
- Before fitting the device, set the child seat up in the desired position using the adult seatbelt, find and mark the position for the child seat upper restraint strap.
- Remove the child seat, fold the seat back down and mark the lower and upper anchor holes.
- Use a 7/16" drill for anchor holes. The 'D' ring should fit approximately 100mm maximum below the seat top frame tube (see Figure 3-14b for more detail).

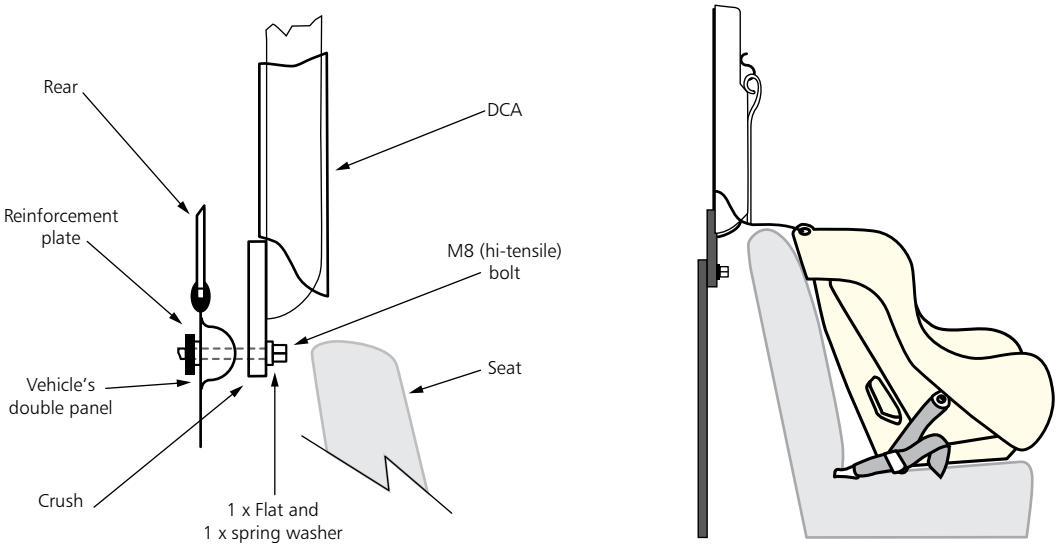
3-A6 Dual Cab Anchorage

Below is the instruction manual copied from the product's manufacturer with some editorial changes:

1. Position the DCA above the rear seat upright and check that the bolt holes can be easily located on the double panel under the rear window rubber (see Figure 3-26).
2. Mark the centre line of the seating position onto the double panel.
3. Using the anchorage as a template, mark the position of the mounting holes onto the double panel, 60.5mm either side of centre line.

   Note: On a Nissan Navara, drill out upper headrest mounting captive nuts.
4. Drill a 3mm (1/8") pilot hole through both panels.

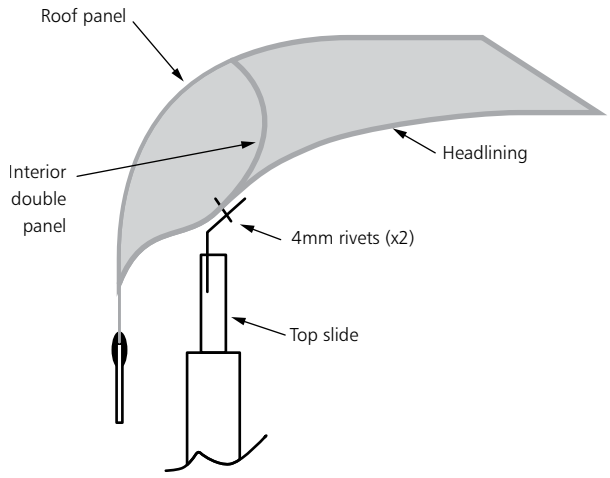
Figure 3-26:
Dual Cab Anchorage



5. Enlarge the interior panel hole to 7/16" and exterior panel hole to 8.5mm (11/32").
6. Fit brass crush tube/s through 7/16" holes until contact is made with the exterior panel.
7. Mark the tubes and cut approximately 0.5mm shorter than the mark, and then cut the bolts 16-17mm longer than tubes.
8. Fit the top slide part to the anchorage - assemble bolts, washers and crush tubes to the anchorage and fit it to the interior panel.
9. Position the reinforcement plate (250x32x6mm) on the outside of the cab, with its rubber sealing strip facing toward the cab. Then hand-tighten the screws.
10. Position the top slide so that the 4mm rivets can be fitted (a No.20 panel drill can be used for this purpose) approximately 10mm above the window rubber.

    Note: A double panel is located behind the headlining, see Figure 3-27.

Figure 3-27:
Installation diagram for DCA rivets



11. Tighten the M8 bolts and fit a third 4mm rivet, if required, to prevent the top slide from rattling, see Figure 3-27.
12. This unit is supplied with an anchor bolt fitting. If using a "hook" type fitting, remove the anchor bolt and fit the hook anchor plate using the 5/16" UNC x 5/8" screw supplied with the kit. Don't use bolts or spacers supplied with the hook anchor fitting.

Operation:

- Depress 6mm pins on each side of the anchorage and slide the front panel up far enough to swing the "0" ring forward, Then feed the tether strap or harness up through the "0" ring and attach to the anchor bolt.
- Push the "0" ring back and slide the front panel down to the locked position and listen for a "click".
- Adjust the tether strap as required.

Each anchorage is supplied with a cover which must be used whenever the seating position is occupied by an adult, or a child using a harness, to prevent possible head injury caused by impacting the anchorage in a crash.

Note: The lower edge of this cover will need to be cut in order for it to be installed in a Nissan Navara, as use of an unmodified cover will prevent the seat latch mechanism from securely locking.

3-A7 Toyota Commuter Bracket

Below is the instruction manual copied from the product's manufacturer with some editorial changes:

- Using a small screwdriver, open the flaps on the sides of the grab handles on the back of the seats.
- Using a small Phillips-Head screwdriver, remove the grab handles and discard the 6mm screws that were holding them.
- Position the anchorage bracket with the curve side downward. Place the grab handles over the anchorage bracket and using the 6mm x 35mm Cap Head, 12-9 Hi Tensile graded bolts supplied, fit the handle and the anchorage bracket back onto the seat and tighten by hand, so as not to force the bolt through the grab handle.

4

Child restraints for children with special needs

 Child asleep in correctly fitted child car seat

4 Child restraints for children with special needs

4.1 Scope

This module is provided to RMS Authorised Restraint Fitters for their information only on the processes involved in installing child restraints prescribed for children with special needs or medical conditions. This module should not be used by restraint fitters to supply or install restraints except as part of a case-by-case assessment by a prescriber as described below.

4.2 Children with disabilities or medical conditions

Certain children with a disability, medical condition or challenging behaviour require specialist, multidisciplinary, case-by-case assessment, which means general guidelines on restraint practices are not appropriate. Such children often require special consideration when they are passengers in vehicles.

There is an Australian/New Zealand Standard covering child restraint practices for children with medical, physical or behavioural needs, AS/NZS 4370: R*estraint of children with disabilities, or medical conditions, in motor vehicles*. This Standard is aimed at the person responsible for prescribing the appropriate restraint option for the child. This person is defined as a 'prescriber' in AS/NZS 4370 as follows:

> **Prescriber:** the person or persons responsible for assessing an individual child's needs and prescribing the way in which a child with a disability or medical condition should be transported in a motor vehicle. For example, occupational therapist, physiotherapist, medical practitioner, rehabilitation engineer.

There are a range of child restraint options available, as outlined in Table 4-1. A prescriber will assess the child's specific needs, and then determine which type of restraint system is suitable. This assessment process takes into account a broad range of factors, including those related to the child and their particular disability or medical condition, the capacity of the parents and other regular carers to appropriately restrain the child, which include physical, practical and financial constraints, the vehicle in which the child will be travelling, and available restraint options. This assessment process is laid out in more detail in AS/NZS 4370:2013.

Restraint fitters can assist with this process by providing installation services for families once an appropriate restraint has been prescribed. This may include typical restraint installation for complying restraints or modified complying restraints, but may also involve vehicle modifications in some circumstances.

The prescribing process is as follows:

a) The prescriber assesses the individual child's restraint needs.

b) The prescriber analyses the assessment to determine the most appropriate restraint solution using the prescribing flowchart shown in Figure 4-1.

c) The prescriber completes the 'Advice to Parent(s)' form.

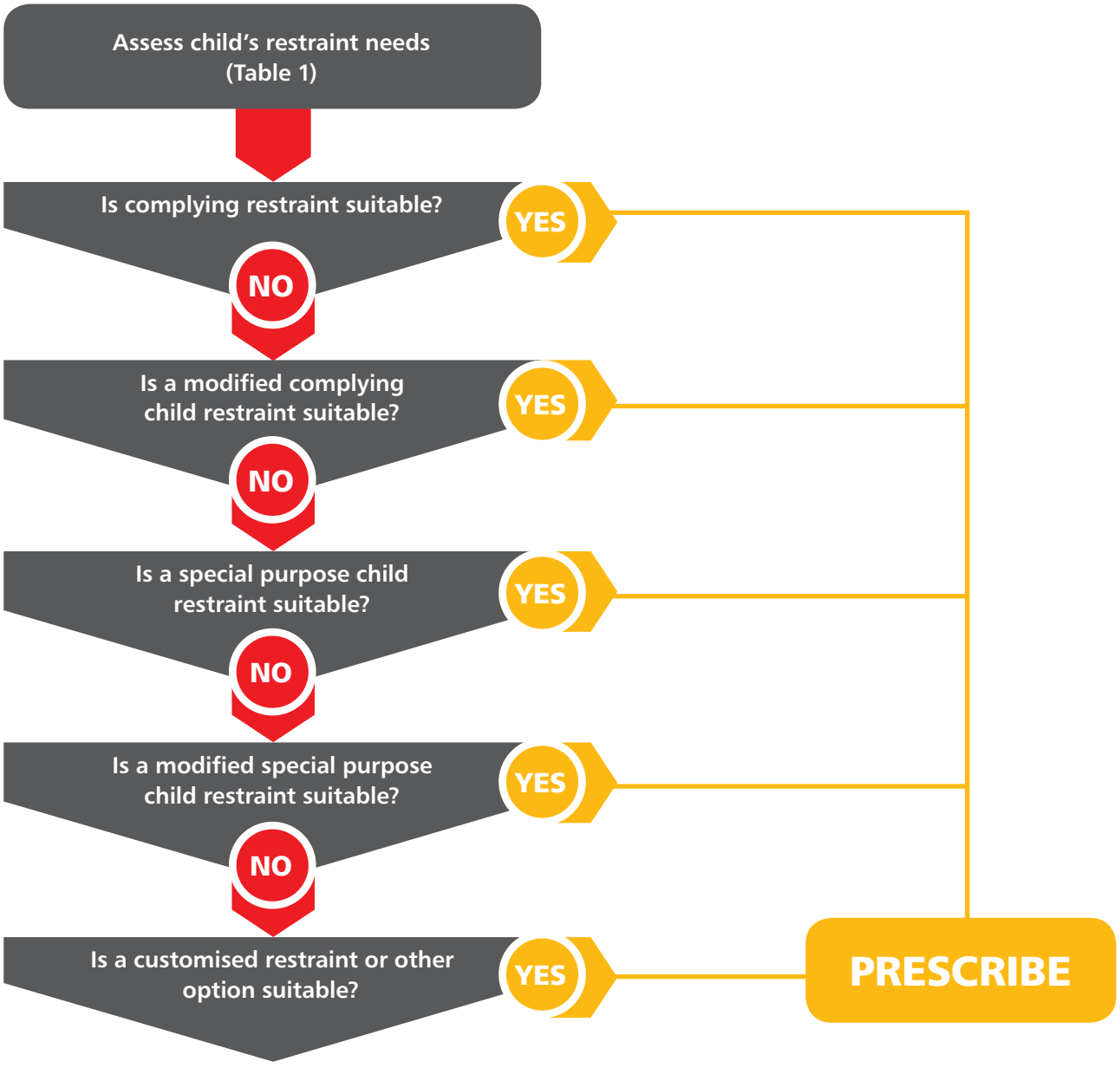
Table 4-1:
Restraint options for children with a disability, or medical condition travelling

Option	Type of restraint	Legal/other requirements
1	**Complying child restraint** Also known as an 'approved child restraint', 'approved booster seat' and 'approved child safety harness'.	Children under 7 years of age must be secured in a suitable child restraint that complies with the Australian/New Zealand Standard 1754 Child restraint systems for use in motor vehicles.
2	**Complying child restraint, with modifications** Any type of modification means the restraint no longer complies with AS/NZS 1754.	A medical certificate must be carried by the driver at all times when the child is travelling in the vehicle.
3	**Special purpose child restraint** This type of restraint is mostly manufactured overseas and must comply with Road Rule 2014 exemption requirements to legally be used in a motor vehicle in NSW.	A medical certificate must be carried by the driver at all times when the child is travelling in the vehicle.

4 Child restraints for children with special needs

Option	Type of restraint	Legal/other requirements
4	**Special purpose child restraint, with modifications** A modified special purpose child restraint must comply with Road Rule 2014 exemption requirements to legally be used in a motor vehicle in NSW.	A medical certificate must be carried by the driver at all times when the child is travelling in the vehicle.
5	**Customised restraint, or other option** A medical certificate must be carried by the driver at all times when the child is travelling in the vehicle.	This option should only be considered in extreme circumstances

Figure 4-1:
Prescribing flow chart



4 Child restraints for children with special needs

4.3 Modifications to complying child restraints

When a complying restraint cannot be used, modifications to a complying restraint may be required. Modifying an approved child restraint means the child restraint no longer meets the requirements of AS/NZS 1754. Some AS/NZS 1754 certified child restraints can be modified to meet the individual needs of children with a disability or medical condition. Depending on the type of modification, AS/NZS 4370:2013 defines a modified child restraint as:

> **Modified child restraint** is a child restraint that includes accessories, postural supports, and/or additional padding that are not provided with the child restraint, and are not included in the child restraint manufacturer's instructions for use.

Common modifications prescribed for AS/NZS 1754 certified child restraints include an extended crotch strap or additional padding.

If a modified child restraint is prescribed, the parent/carer will be provided with a form which includes, as a minimum, information for installing, using and maintaining the modified child restraint. It will also include the reason why the modification is recommended, a detailed description of the modification, whether the modification is reversible as well as the period of time the modification is recommended, which must be no more than 12 months without review.

The parent/carer must also be advised in writing that the restraint is to be used only by the child for whom it was modified, and that they are not to carry out further modifications to the child restraint without reference to the person who prescribed the modification.

Drivers carrying passengers using a modified child restraint must carry a certificate signed by a registered medical practitioner stating that because of a medical condition or physical disability it is impracticable for the child to use an approved restraint. The certificate must show the date on which the exemption expires (e.g. in the case of children in casts).

4.4 Special purpose child restraints

A special purpose child restraint is defined in AS/NZS 4370 as a child restraint that is specifically designed and designated as suitable for use by a child with a disability or medical condition that complies with one or more of the following standards:

- AS/NZS 1754
- Canadian Motor Vehicle Safety Standard 213 (CMVSS 213)
- US Federal Motor Vehicle Safety Standard 213 (FMVSS 213)
- United Nation – Economic Commission for Europe Regulation 44 (UN ECE R 44)

In Australia, all special purpose child restraints currently available are supplied from overseas. Not one of the special purpose child restraints comply with AS/NZS 1754. Examples of special purpose child restraints are listed in Table 4-2 where all of these restraints comply with at least one of the overseas standards listed above.

Some child restraints may require modifications to be made to the vehicle (e.g. seat belt/anchor points strengthened, or additional anchor locations) for safe installation. These modifications must be carried out by a trained fitter and checked by an RMS licensed certifier. The list of RMS licensed certifiers can be downloaded from the following website:

http://www.rms.nsw.gov.au/documents/business-industry/examiners/vsccs-bulletin-01-licensed-certifiers.pdf

Documentation for Special Purpose Restraints

Prescribers should request child restraint manufacturers or distributors to provide the following, in English, for each child restraint for a child with a disability that is not certified to AS/NZS 1754.

- test data
- standard/regulation compliance certification
- fitting instructions for the user
- instructions for the installation in the vehicle
- labelling on the child restraint instructions for use.

4 Child restraints for children with special needs

Table 4-2:
Examples of Special Purpose Child Restraints.

Product	Design features	Recommended size range
Carrot 3000 	■ Forward-facing ■ Modular pieces to suit size of user ■ Shoulder protector wings option for a child with seating height more than 65cm ■ Broad growth range to suit infants to older children ■ Swivel base ■ Slightly reclinable	Designed for children Between 3 and 15 years Body weight: 15 to 36kg
Columbia orthopaedic restraint 	■ Forward-facing (fixed) ■ Height adjustable ■ Padded head supports ■ Seat depth extender ■ Four lateral positioning foam pads ■ Pommel ■ Tether Strap	**Model 2000** Body weight: 9 to 46kg Height: up to 152cm **Model 2500** Body weight: 18 to 58kg Height: 137 to 167cm
Columbia Spirit 	■ Forward-facing ■ Adjustable padded head supports ■ Open sides for easy transfer ■ Recline up to 30° ■ Swing-away lateral and hip supports ■ Broad range of width adjustment ■ Seat depth extender ■ Pommel ■ Tether Strap	Body weight: 11.3 to 59kg Height: up to 167cm

4 Child restraints for children with special needs

Product	Design features	Recommended size range
Lars child restraint 	■ Forward-facing ■ Width and depth adjustable seat ■ Back height adjustment ■ Adjustable hip supports ■ Swivel base ■ Height and angle adjustable footrest ■ Tilt up to 25 degrees ■ Optional head and lateral supports ■ Range of positioning accessories	Available in two sizes Body weight: up to 36kg
Snug Seat Traveller plus 	■ Forward-facing ■ Optional padded abductor ■ Height adjustable headrest ■ Reclinable ■ Support padding ■ Buckle guard ■ Optional seat extension	Body weight: 10 to 47.5kg Height: up to 142.2 cm
Timy 	■ Forward-facing ■ Swivel base ■ Reclinable ■ Height and angle adjustable footrest ■ Additional position padding for head and torso ■ Support tray option ■ Rigid fibreglass shell can support many body support accessories	**Model Junior** Body weight: 36kg Age: 2 to 6 years **Model Standard** Body weight: 36kg Age: 4 to 12 years **Model Senior** Body weight: 36kg Age: 6 to 14 years **Model Maxi** Body weight: 49kg Age: 8 to 16 years

4 Child restraints for children with special needs

Product	Design features	Recommended size range
Recaro Start 2.0 	■ Forward-facing ■ Adjustable height, shoulder width and seat cushion length ■ Wide shoulder width ■ Reclinable ■ Swivel Base ■ Padded Lateral head and Thoracic supports ■ Tray, footrest	Body weight: 15 to 36kg
Starlight SP 	■ Adjustable headrest ■ Reclinable ■ Swivel Base ■ Padded lateral head and thoracic supports ■ Tray, footrest	**Model Small SRYS-RK1** Body weight: 9 to 18kg **Model Large SRYS-RK2** Body weight: 18 to 36kg

4 Child restraints for children with special needs

4.5 Other information

Funding is available to assist families with their child's restraint needs

EnableNSW provides appropriate assistive technology devices and specialised support services to assist eligible residents of NSW with a permanent or long-term disability to live and participate in their family and community through the Aids and Equipment Program (A&EP). Parents or carers of children with a disability interested in seeking further information about the program should discuss their query with a health care provider, or contact EnableNSW on one of the following details:

Phone: 1 800 ENABLE (1 800 362 253)
Fax: 02 8797 6543
Mail: Locked Bag 5270 Parramatta NSW 2124
E-mail: enable@hss.health.nsw.gov.au

4.5.1 More Information

The TranSPOT committee (formerly known as the Transport Seating Working Group) initially formed in 1989 and is now affiliated with Speech Pathologists, Physiotherapists and Occupational Therapists working in Developmental/Intellectual Disability (SPOT on DD).

The committee comprises of therapists, vehicle specialists/modifiers, authorised restraint fitters, mobility engineers, equipment suppliers, individual positioning customisers/technicians, and representatives from the Assisted School Travel Program (DEC), Transport for NSW and EnableNSW. Links are maintained with external organisations within and outside NSW, including other states and international contacts.

The committee meets approximately six times per year. Resourcing questions sent to the committee are discussed and responses provided. The responses reflect a risk minimisation approach to promote safe seating, positioning and assistive technology solutions in transport. The knowledge and expertise of the group members, current evidence, best practice, relevant legislation, and Australian and International Standards / guidelines, are considered and disseminated through SPOT on DD or other avenues.

For further information contact:
SPOT on DD
PO Box 2283
Hornsby Westfield 1635
Email: secretary@spotondd.org.au

NSW GOVERNMENT Transport for NSW

Centre for Road Safety

Author: Basuki Suratno, Senior Research and Policy Analyst
Reviewer: Dan Leavy, Safer Vehicles Manager