



Retro-Fitting Seat Belts to Buses and Coaches

Background

In recent years, Australian Design Rules (ADRs) have progressively introduced the installation of seat belts and other occupant protection measures in new buses and coaches. The introduction of these ADRs along with strong public demand for improved occupant protection has resulted in bus and coach owners fitting seat belts to vehicles, which were not originally fitted with seat belts.

Introduction

The Roads & Traffic Authority (RTA) requires that all buses and coaches not originally fitted by the manufacturer with seat belts and which will be retro-fitted with seat belts are to be certified as complying with either the intent of the relevant ADRs or the '*Voluntary Modification of Existing Buses and Coaches – Guidelines to Improve Occupant Protection*'.

Apart from this, the installation of additional seats and their corresponding seat belts installed in accordance with Vehicle Standards Bulletin 5A – '*National Code of Practice – Commercial Manufacture and Installation of Additional Seats*' may also be considered acceptable, providing the seat belts are installed together with the seats.

Therefore, two methods may be used to ensure that retro-fitted seat belts are installed to provide adequate protection, these are:

- Australian Design Rules.
- *Voluntary Modification of Existing Buses and Coaches – Guidelines to Improve Occupant Protection*

Australian Design Rules

The four ADRs that relate to seat belt requirements are: ADR 4/... “*Seat belts*”, ADR 5/... “*Anchorage for Seat belts*”, ADR 66/... “*Seat Strength, Seat Anchorage Strength and Padding in Omnibuses*” and ADR 68/... “*Occupant Protection in Buses*”.

ADR 4/... “*Seat belts*”

Specifies requirements for seatbelts to restrain occupants under impact conditions, to assist the driver to remain in his seat and maintain control of the vehicle in an emergency situation, and to provide protection against ejection in an accident situation.

ADR 5/... “*Anchorage for Seat belts*”

Specifies requirements for the anchorages so that they may be adequately secured to the vehicle structure or seat.

ADR 66/... “*Seat Strength, Seat Anchorage Strength and Padding in Omnibuses*”

Specifies requirements for the strength of seats, seat-anchorages and seat belt anchorages of certain omnibuses; and for protecting occupants from accessories on the seat and the armrest.

ADR 68/... “*Occupant Protection in Buses*”

Specifies for certain omnibuses, requirements for seat belts, the strength of seats, seat-anchorages, seat belt anchorages and child restraint anchorages and provisions for protecting occupants from impact with seat backs and accessories on seats and armrests.

Seat belts installed, as per the latest edition of ADR 4,5, 66 and 68 will need to demonstrate compliance with these standards.

Acceptable demonstration is by an engineering certificate supported by either calculations or testing. The certificate must be issued by a recognised RTA engineering signatory.

Voluntary Modification of Existing Buses and Coaches

These ‘*Guidelines*’ comprising of four sections provides guidance to bus and coach operators who wished to improve occupant protection in their vehicles. Section 4 includes the minimum specification for the installation of seat belts in buses and coaches manufactured before the implementation of the relevant Australian Design Rules (ADRs) and procedures for inspecting vehicles for structural integrity.

Conformance to section 1 of the ‘*Guidelines*’ is a necessary pre-requisite before further improvements of section 4 are undertaken.

Appendix 5 of the ‘*Guidelines*’ list the force loads transmitted to the seat and seat mountings in a 10g deceleration.

Test	Peak load measured for 20 milliseconds	Peak load centre height	Mean load measured for 100 milliseconds	Mean load centre height
Level 4 protection, lap-belted occupants plus rear impact	28.6 kN	720 mm	17.3 kN	556 mm

These loads (tabled above) are used to assess the adequacy of the seat mounting and the seat strength (for twin seats) and should be used when designing alternative mounting system. These loads should be halved for single seats.

Acceptable demonstration of the ‘*Guidelines*’ is by an engineering certificate supported by either engineering calculations or testing. The certificate must be issued by a recognised RTA engineering signatory.

Vehicle Standards Bulletin 5A

This code of practice is for the installation of additional seats together with the fitment of seat belts. The ADR vehicle categories applicable to this code of practice are the following vehicle categories: MA, MB, MC, MD, NA and NB1.

Additional seats are divided into three categories to allow seats to be designed for occupants of different size and mass. The seat categories are:

Category 1: Seats intended for use by adults

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

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

Seat belts

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

All outboard seating positions must be fitted with lap sash or harness seat belts except where there is no permanent structure for mounting the upper sash or anchorages point, as set out in the latest edition of ADR5/..., in which case lap belts must be fitted.

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

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

Seat belts must comply with the latest edition of ADR4/...

Seat belt anchorages

Seat belt anchorages must comply with the latest edition of ADR5/... with the exemption that the anchorage test loads for Category 2 and 3 seats are reduced to:

Category 2 seats - 50 per cent of test load nominated in the latest edition of ADR5/...

Category 3 seats - 35 per cent of test load nominated in the latest edition of ADR5/...

Acceptable demonstration of VSB 5A is by engineering calculations or testing.

Note:

- **Persons contemplating retro-fitting seat belts to their vehicles are advised to seek the assistance of an engineering signatory prior to commencing the installation.**
- **The RTA reserves the right to reject engineering certificates deemed not to satisfy the requirements of the standard it is certified to meet.**

Further Information - RTA Technical Enquiries Tel: 1300 137 302

Email: tech-enq@rta.nsw.gov.au

or: **RTA Blacktown:**
Technical Enquiries
Level 1, 85 Flushcombe Road
PO Box 558
BLACKTOWN NSW 2148
Fax: (02) 9831 0913

RTA Wollongong:
Technical Enquiries
104 Market Street
PO Box 5398
WOLLONGONG NSW 2500
Fax: (02) 4225 8844

RTA West Gosford:
Technical Enquiries
PO Box 6098
WEST GOSFORD NSW 2250
Fax: (02) 4323 9905