

# Dedicated rally vehicle technical manual

Specifications applicable to the registration of rally cars under the Rally Car Conditional Registration Scheme

November 2013



Transport  
for NSW

Developed in association with:



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DATE:	27 November 2013
VERSION:	1.2 November 2014
REFERENCE:	PR12/06423
DIVISION:	Policy & Regulation

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## I. INTRODUCTION

### I.1 SCOPE AND GENERAL

This Technical Manual applies to Rally Vehicles intended to be registered under the Conditional Registration of Dedicated Rally Vehicles Scheme in NSW. It specifies the modifications that may be done to standard production vehicles to enable them be registered on the scheme to be used in rally events. It must be read in conjunction with the *Rally Vehicle Scheme Memorandum of Understanding* (the MOU) developed between the Roads and Maritime Services (RMS) and the Approved Organisations.

The requirements outlined in this Technical Manual provide general guidance only. RMS/Approved Organisation Scrutineers and Licensed Certifiers are required to exercise their knowledge, expertise and experience to make a full assessment of the vehicle.

If an RMS/Approved Organisation Scrutineer is unable to assess a modification, or if a modification is a 'significant modification', they must refer the vehicle in question to a Licensed Certifier for assessment. No authorising documentation for registration is to be issued by the RMS/Approved Organisation Scrutineer in this instance until the matter is resolved.

### I.2 DEFINITIONS AND INFORMATION

The definitions below, and those given in the MoU as amended below, apply to this Technical Manual.

**FIA** is the *Fédération Internationale de l'Automobile*.

**Ground clearance** is the minimum distance to the ground from the under side of a vehicle excluding its tyres, wheels, wheel hubs, brake backing plates and flexible mudguards or mudflaps.

**Rally Vehicle** is a passenger car-based vehicle, not being a three-wheeled car, motorcycle, truck, bus, plant or trailer, that complies with the relevant NSW vehicle standards and the permissible modifications detailed in this Technical Manual.

Vehicles eligible to be a Rally Vehicle include those:

- produced for the Australian market – the compliance plate issued by the vehicle's manufacturer must be affixed to the vehicle and in its proper position; or
- imported as a Rally Vehicle – a copy of the Vehicle Import Approval issued by the federal Department of Infrastructure and Regional Development (DIRD), or its predecessor, must be presented with the Rally Vehicle Declaration; or
- imported under the commonwealth government's Personal Imports Scheme, Low Volume Scheme or Registered Automotive Workshop Scheme – the import plate or label issued under these schemes must be affixed to the vehicle, and a copy of the Vehicle Import Approval issued by the DIRD, or its predecessor or successor, must be presented with the Rally Vehicle Declaration, or
- that are individually constructed vehicles.

**Licensed Certifier** A person authorised under the RMS Vehicle Safety Compliance Certification Scheme (VSCCS) to assess, inspect and certify modified vehicles and individually constructed vehicles.

**May** indicates a choice.

**Must** indicates a requirement that is mandatory for compliance with this Technical Manual.

**Running clearance** is the distance from the surface on which an unladen vehicle is standing to the lowest point on the vehicle excluding unsprung mass.

**Should** indicates a recommendation.

### I.3 VEHICLE STANDARDS

An eligible Rally Vehicle must comply with the relevant NSW vehicle standards specified in the Road Transport (Vehicle Registration) Regulation 2007, except where specifically allowed in this Technical Manual.

Vehicles imported as Rally Vehicles must be certified to comply with the NSW vehicle standards for personal imports; refer to Vehicle Standards Information 4 *Registration of imported vehicles in NSW*.

#### **1.4 WORKMANSHIP**

All modifications to eligible Rally Vehicles and/or their components must be done using sound engineering practice and design and must not result in a reduction in strength of any structural component or the vehicle as a whole. The vehicle's controllability must not be adversely affected by the modifications.

Fitting and/or storage of additional equipment such as spare tyres, spare parts, wheel chocks, fire extinguishers, navigation devices, etc must be engineered to take into account the potential for injury to vehicle occupants in the event of a crash. Additional equipment and their fittings must be kept secure, and must not cause the vehicle to exceed the mass rating limits of the vehicle components and the mass limits for standard vehicles under road transport law.

NOTE: Guidance on many types of vehicle modifications is given in Vehicle Standards Bulletin 14 *National Code of Practice for Light Vehicle Modification and Construction*, which is available on the DIRD's website at [http://www.infrastructure.gov.au/roads/vehicle\\_regulation/bulletin/vsb\\_ncop.aspx](http://www.infrastructure.gov.au/roads/vehicle_regulation/bulletin/vsb_ncop.aspx).

#### **1.5 VEHICLE MODIFICATIONS AND CERTIFICATION**

The vehicle's owner is responsible for ensuring that the vehicle is in a roadworthy condition at all times. An RMS/Approved Organisation Scrutineering check should be carried out on the vehicle when modifications are completed.

A vehicle must be inspected after the following modifications:

- 1 Modifications affecting the level of performance, safety, strength or reliability of vital systems such as brakes, suspension, steering, drivetrain or the integrity of the passenger compartments, including seats, seat belts and their anchorages.
- 2 One that produces a vehicle which has an engine of greater power output than the most powerful engine available from its original manufacturer. The power increase may result from a modification such as turbocharging or an increase in displacement volume. An increase in displacement volume due to engine reconditioning within normal trade does not require inspection.
- 3 One that produces a vehicle which has one or more critical original components of the following systems substituted by components different from those provided as standard equipment for the vehicle concerned:
  - axles;
  - suspension;
  - steering; and
  - braking systems.

Many of these modifications are classified as 'significant modifications'. If a vehicle subjected to a significant modification is intended to be registered for unrestricted use on roads or road related areas in NSW, it must be assessed and certified by a Licensed Certifier.

## **2. BODY/CHASSIS**

### **2.1 GENERAL**

Bodywork may be modified to accommodate alternative components. Modifications must not result in a reduction in the vehicle's mechanical strength, affect the driver's vision, or include protrusions or scoops that present a risk to pedestrians and cyclists.

### **2.2 STRENGTHENING/SEAM WELDING**

- 2.2.1 Joints may be welded that were previously spot welded by the manufacturer.
- 2.2.2 All the suspended parts may be strengthened provided the material used follows the original shape and is in contact with the original part.
- 2.2.3 Composite materials may be used as reinforcement.
- 2.2.4 Mounting points for ancillary equipment may be relocated or removed, e.g. spare wheel mounting bracket.
- 2.2.5 All additional equipment mounted in the passenger compartment e.g. spare tyre, fire extinguishers etc must be secured to withstand a force of twenty times their mass in any direction.
- 2.2.6 The original holes in the bodywork may be closed by welding plates.
- 2.2.7 The edges of the wing panels may be folded back if they protrude inside the wheel housing.
- 2.2.8 Jacking points may be strengthened, moved and increased in number.
- 2.2.9 A maximum of two air vents may be incorporated in the vehicle's roof structure.

### **2.3 INSULATION MATERIAL AND TRIM**

- 2.3.1 Removal of trim must not increase the risk of injury to vehicle occupants. Areas which have the potential to cause injury must be suitably padded and all sharp edges must be treated prior to fixing durable high density impact absorbing material.
- 2.3.2 Insulating material may be removed from under the floor, from the engine compartment, the luggage boot and the wheel arches.
- 2.3.3 Carpet and insulating material may be removed from the passenger compartment, or additional insulation material may be fitted.
- 2.3.4 Plastic sound proofing from the underside of the wheel arches may be removed.
- 2.3.5 Trimmings below the dashboard and which are not part of it, may be removed.
- 2.3.6 If centre console is removed, controls or instruments it houses must be removed or relocated where they can function without being damaged.
- 2.3.7 The soundproofing material may be removed from the doors providing it does not modify the internal shape of the doors. Electric window controls may be replaced with manual winders. Door trim and all door hardware and fittings must remain in place.
- 2.3.8 All insulation material and head lining may be removed from the underside of the roof.

### **2.4 ACCESSORIES**

- 2.4.1 Vehicles may be fitted with an alternative steering wheel.
- 2.4.2 Under body protection plates may be fitted e.g. fuel tank and engine sump guards.
- 2.4.3 Additional safety fasteners may be fitted to the windscreen and to any side windows.
- 2.4.4 The original bonnet fasteners must be retained and be supplemented by a second fastening system. The cabin release system may be removed or disconnected.
- 2.4.5 The original windscreen may be replaced by a laminated windscreen.

- 2.4.6 The capacity of the washer tank may be increased and its location may be moved to inside the cockpit.
- 2.4.7 Dash instruments i.e. speedometer, fuel gauges, etc may be added to or replaced, providing the additions or replacements do not become a hazard The instruments do not require variable light intensity.
- 2.4.8 The original audible warning device (i.e. horn) may be replaced but the replacement must be a mono-tone. A second device for operating the horn may be situated on the passenger's side of the vehicle.

## **2.5 SEATS AND SEAT ANCHORAGE POINTS**

- 2.5.1 Original seats may be replaced by seats that comply with Appendix A.
- 2.5.2 The front seats may be relocated backwards from the original anchorage points. Unless the rear seat has been removed, no part of the base of the seat may be moved beyond the vertical plane defined by the front edge of the original rear seat. If it is intended to move the base of the front seat beyond this point, the seat belt or safety harness must function correctly.
- 2.5.3 If a seat must hinge or fold to permit access to or egress from another seat, the seat must be fitted with a self-locking device with the release control being readily accessible to both the occupant of that seat and the occupant of a seat immediately behind that seat.
- 2.5.4 The rear seats may be removed completely.
- 2.5.5 The rear seats must be removed if a safety cage or harness type seat belts are installed.  
Note: 'Safety cage' is also known as 'roll cage' and includes roll bars.

## **2.6 SAFETY HARNESES AND THEIR ANCHORAGE POINTS**

- 2.6.1 Standard seat belts may be replaced by safety harnesses that comply with FIA specifications or an Approved Organisation's specifications.
- 2.6.2 Safety harnesses must be installed in accordance with Appendix A.
- 2.6.3 Full harness rear mounting points must be fixed to a substantial part of the vehicles structure or the safety cage.

## **2.7 SAFETY CAGE**

A safety cage may be fitted provided:

- (a) it is padded with high density impact absorbing material of a minimum density 300kg/m<sup>3</sup> to minimise injury to the vehicle occupants; and
- (b) it complies with the FIA specifications or an Approved Organisation's specifications.

## **2.8 FUEL SYSTEM AND FUEL TANKS**

**2.8.1 General** Fuel system modifications must meet the requirements specified below.

### **2.8.2 Location**

- 2.8.2.1 The fuel system, or any part of it, must not form the widest part of the vehicle.
- 2.8.2.2 The fuel tank, or any part of it, must not be in front of the vertical transverse plane crossing through the centre line of the front wheels.

### **2.8.3 Design Requirements**

- 2.8.3.1 The design of the fuel system must not provide for gravity or self sustaining feed to the carburettor or injector.
- 2.8.3.2 The device for controlling the flow of fuel from or between fuel tanks must be either within reach of the driver from the normal driving position or outside the driver's cab.

- 2.8.3.3 Diesel fuelled vehicles must be provided with a device which controls the flow of fuel to the engine. The device must have a stable “OFF” position and require a positive manual action to adjust it to the “ON” position.
- 2.8.3.4 The filler pipe must be designed and protected in such a way that overflow from a filling operation would be prevented from spilling on any part of the exhaust or electrical system except a fuel level indicator assembly.
- 2.8.3.5 Each fuel tank must be designed so that when it has been filled there is provision for 5% expansion of the fuel without spillage.
- 2.8.3.6 At least one safety vent must be provided in that part of the fuel tank which is above the level of fuel when it has been filled.
- 2.8.3.7 Safety vent(s) must not discharge into an enclosed compartment.
- 2.8.3.8 Fuel tank drain fittings, except for fuel cross-over pipes and relative fittings, must not extend by more than 20mm beyond the surface of the fuel tank on which they are fitted, or a plane tangential to at least 3 points on the fuel tank which are located within 75mm of the centre line of the fittings.
- 2.8.3.9 Fuel lines may be re-routed through the cabin providing there is protection against impact damage. Joints may only be made at the front and rear bulkheads.
- 2.8.4 Capacity of Fuel Tank(s)** The total capacity of the fuel tank(s) fitted must not exceed the following limits:

Engine capacity (cc)	Total fuel tank capacity (litres)
≤ 700	60
701 – 1000	70
1001 – 1300	80
1301 – 1600	90
1601 – 2000	100
2001 – 2500	110
≥ 2501	120

## 2.9 ELECTRICAL AND LIGHTING SYSTEM REQUIREMENTS

- 2.9.1 Additional lighting may be installed provided the modification does not use any protrusions that are likely to increase the injury to a pedestrian or other road user in the event of a crash. Additional lights must be installed in a manner that ensures the geometric visibility requirements of the original lights and the number-plates are maintained. All front-facing lights, except direction indicator lights, must only produce white or yellow light, and all rear-facing lights, except reversing or direction indicator lights, must only produce red light. Additional forward facing lights must only function when the vehicle’s main (i.e. high) beam is illuminated. Additional reversing lights must only function when reverse gear is engaged, and may be switchable so that they do not function on all occasions when reverse gear is engaged.
- 2.9.2 The vehicle may be equipped with six headlamps, i.e. four high beam headlamps comprising two low beam/high beam headlamps and two high beam headlamps, and two driving lamps; or two low/high beam headlights and four driving lights.  
  
Note: It is an offence under the Road Rules 2008 to use a light fitted to a vehicle in a manner that is likely to dazzle another road user.
- 2.9.3 Forward facing headlamps and driving lamps must emit only white light.

- 2.9.4 The vehicle may also be equipped with two forward facing fog lamps that must only be capable of being operated when low beam is operated.
- 2.9.5 Forward facing fog lamps must emit only white or yellow light in a beam that does not project above the centre of the fog lamp lens.
- 2.9.6 The battery must be appropriately secured.
- 2.9.7 Electrical wiring must be appropriately secured and protected from earthing/short circuiting, heat and other damage.

## **2.10 SUPPLEMENTAL RESTRAINT SYSTEMS**

Supplemental restraint systems may be removed or disabled. Where this occurs, suitable notices, labels or stickers must be affixed to the dashboard and be visible to the driver and passengers, warning occupants that the specific supplemental restraint systems have been either removed or disabled.

## **2.11 RUNNING CLEARANCE**

The vehicle and its component parts must meet the running clearance requirements specified in Appendix B. All modifications, including those to the suspension and exhaust systems, must ensure these requirements are maintained.

### **3 STEERING, SUSPENSION, WHEELS AND TYRES**

#### **3.1 STEERING**

- 3.1.1 Vehicles imported as Rally Vehicles or imported under the Personal Import Scheme may be left hand drive. Vehicles may be converted from left- to right-hand drive. Vehicles must not be converted from right- to left-hand drive.
- 3.1.2 Steering modifications must not adversely affect the vehicle's controllability.
- 3.1.3 Steering components may only be modified by cutting, heating or welding if engineering certification is provided. If heating or welding has been done, the engineering report must include an applicable metallurgic report.
- 3.1.4 Modifications to steering components must ensure the turning circle in either direction, as determined by reference to the extreme outer edge of the tyre track at ground level, does not exceeding 25 metres in diameter.

#### **3.2 SUSPENSION COMPONENTS**

- 3.2.1 Suspension components may be strengthened by welding additional metal providing the reinforcement follows the original contour of the part being modified.
- 3.2.2 The material in suspension joints may be changed (e.g. rubber to urethane).
- 3.2.3 Ball joints and bushings may be changed to spherical type bushings such as rose joints provided they are suitable for automotive use and appropriate for the steering loads likely to be applied.
- 3.2.4 Reinforcement bars may be fitted between the suspension mounting points.

#### **3.3 WHEELS AND TYRES**

- 3.3.1 Rally vehicles may be fitted with tyres that are marked as 'motor sport only'. Tyres that are not manufactured to a road use standard, or 'DOT' or 'E' marked, must be manufactured by a proprietary tyre manufacturer for their intended purpose.
- 3.3.2 Alternative wheels and tyres may be fitted provided the load and speed rating of the replacement wheels and tyres are suitable for the vehicle.
- 3.3.3 Each tyre must be in good condition and free from sidewall damage
- 3.3.4 Each tyre must have at least 1.5mm of tread across the full width of the tyre that contacts the road around its full circumference.
- 3.3.5 Tyres marked "not for highway use" or "for racing use only" or bearing similar restricting markings may be used when the vehicle is travelling between stages of an event to or is being driven to or from an event.

#### **3.4 ELECTRONIC STABILITY CONTROL**

A vehicle's electronic stability control (ESC) should only be disabled if this is an integral function of the system. Disabling the system must have a corresponding warning light fitted in the dashboard and be visible to the driver. If the ESC is temporarily disabled, the system must default to 'on' when the ignition is switched on. If the ESC is permanently disabled, additional conditions may be applied under the MOU to limit the amount of access the vehicle is permitted on the road network.

Note: ESC is also known by a number of other names, such as ESP, DSP and VSC.

## 4 BRAKES

### 4.1 General

Modifications to braking systems, including the removal or disabling of the anti-lock braking system, may be done. Modified braking systems must be of dual circuit design. A brake circuit failure warning light must be in operation if originally fitted to the vehicle. Brake effectiveness must be at least the equal of the original system. Drum brakes may be replaced by disc brakes, but disc brakes may not be replaced with drum brakes. Solid disc brakes may be replaced with ventilated discs but ventilated disc brakes may not be replaced with solid disc brakes. The mechanical parking brake may be replaced by a locking hydraulic unit.

Engineering certification is not required for modifications to the braking system if the modification converts the original braking system to another system supplied by the vehicle's manufacturer as optional equipment for that model vehicle; this includes any braking system homologated by the manufacturer with an Approved Organisation or the FIA that is suitable for the subject vehicle. Other modifications that replace either part or the whole of the braking system must be assessed and certified in accordance with either of the following –

- (a) the procedures outlined in Appendix C; or
- (b) the document *Brake assessment manual*.

The assessment and certification must be conducted by a person registered as a Licensed Certifier or a competent person registered with an Approved Organisation. If option (b) is used, the following changes to the document apply:

- (i) The inspection and certification does not fall under the requirement of the VSCCS, so –
  - A. the inspection may be done by a competent person registered with an Approved Organisation;
  - B. the vehicles do not require a VSCCS certificate and
  - C. testing may not be done on a public road.
- (ii) The ESC may be permanently disabled – refer to Section 3.4.

### 4.2 REPLACEMENT OF HYDRAULIC LINES AND ROUTING

- 4.2.1 Hydraulic lines may be replaced. Hydraulic lines should be made of steel bundy tube. Copper tubing must not be used.
- 4.2.1 All hydraulic lines should be double flared and use appropriate flair connections. Hydraulic lines must not be joined by brazing, silver soldering etc.
- 4.2.2 Hydraulic brake lines may be routed to protect them from damage. They must be mounted in protected areas where they are not likely to be struck or snagged by objects thrown up from the road. The lines must be adequately supported.
- 4.2.3 Hydraulic brake hoses must not be stretched or bent through too tight a radius over the full range of suspension and/or steering travel.
- 4.2.4 Brake hoses must not contact any tyre or wheel or any body, chassis, steering or suspension component over the full range of suspension and steering travel. Abraded lines must be replaced.
- 4.2.5 Brake lines and hoses must be sufficiently clear of and/or be shielded from hot exhaust components.

### 4.3 HYDRAULIC HAND BRAKES

- 4.3.1 A hydraulic hand brake may be used provided a tandem master cylinder or split system is used, and it must be able to be activated while the driver is in the normal seating position.
- 4.3.2 A “Fly-off” hand brake lever may be installed.
- 4.3.3 The hand brake must apply equally and simultaneously to both rear wheels.

## **5 ENGINE**

### **5.1 ENGINE MODIFICATIONS**

- 5.1.1 Rally cars are exempt from having to comply with exhaust emission ADRs on condition that they are subject to any standards which may be specified by the NSW Office of Environment & Heritage.
- 5.1.2 Alternative transmissions and drive line components may be installed.
- 5.1.3 Emission control devices may be removed.
- 5.1.4 Catalytic converters may be removed.
- 5.1.5 Engine crank-case system must be sealed and must not vent direct to atmosphere if the vehicle was manufactured after 1971.

### **5.2 EXHAUST SYSTEM MODIFICATIONS**

- 5.2.1 Exhaust systems may be modified, or different ones installed provided they satisfy the requirements below.
- 5.2.2 The exhaust outlet must extend at least 40mm beyond the furthest outboard or rearmost joint of the floor pan that is not continuously welded or permanently sealed in a manner that could permit direct access of exhaust gases to the passenger compartment.
- 5.2.3 If venting to the side of the vehicle, the exhaust outlet must discharge downwards at an angle to the horizontal of not less than 15 degrees not more than 45 degrees, and to the rear of any opening window or vent.
- 5.2.4 If venting to the rear of the vehicle, the exhaust outlet must discharge at not more than 10 degrees above or 45 degrees below the horizontal.
- 5.2.5 The exhaust outlet must not protrude beyond the perimeter of the vehicle when viewed in plan.
- 5.2.6 The exhaust system, or any of its parts, must not create a hazard from hot surfaces or projections with which persons outside the vehicle are likely to contact.
- 5.2.7 All piping and muffler systems must be adequately supported.
- 5.2.8 There must be no escape path for exhaust gases other than the exhaust outlet.

### **5.3 VEHICLE NOISE**

If vehicle exhaust systems are modified or replaced, the noise emitted from the engine exhaust must not exceed:

- 96dB(A) for a rally car built before 1 January 1982, or
- 90dB(A) for a rally car built on or after 1 January 1982.

## APPENDIX A

### SEATS AND SEAT ANCHORAGES

#### A1 SEATS

Alternative seats fitted in place of the original seats must comply with either:

- (a) the FIA 8855-1999 or FIA 8862-2009 standard (refer to <http://www.fia.com/en-GB/sport/regulations/Pages/FIAStandards.aspx>; or
- (b) be subject to engineering certification that proves that each seat is capable of withstanding a load, equivalent to:
  - (i) 20 times the mass of the entire seat, when applied in either a forward or rearward direction; and
  - (ii) a 370Nm moment about the “seating reference point” applied to the upper cross member of the seat back frame in the rearward direction.

#### A2 SEAT ANCHORAGES

The original seat anchorages must be used or the anchorages must comply with one of the following options:

- (a) Each anchorage of a seat mounted directly to a vehicle floor made from sheet metal must be reinforced using 40mm x 40mm x 3mm steel backing plates. The corners of backing plate must have a minimum radius of 5mm and the edges adjacent to the sheet metal must be chamfered. The seat must be anchored using at least four 8mm bolts. The bolts must be high tensile, and be of a minimum Grade 8.8. Mounting bolts must pass through centre of the steel backing or counter plate; refer to Figure A2(a).

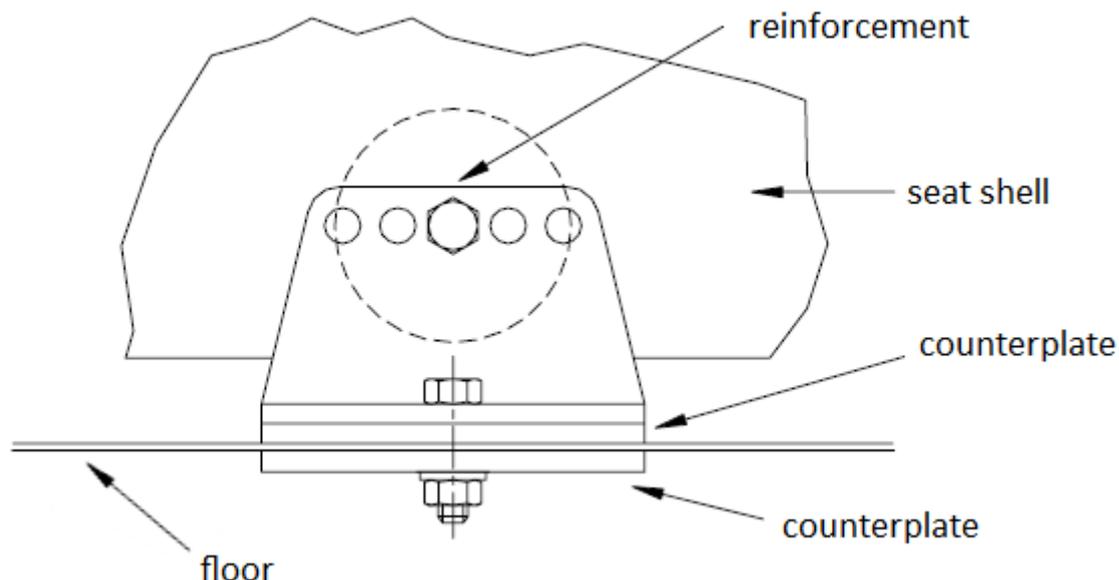


Figure A2(a)

- (b) The seats may be fixed to the anchorage points on a removable cross member as detailed in Figure A2(b) via at least 4 mounting points per seat, using bolts measuring at least 8mm in diameter that are high tensile, and a minimum Grade 8.8. Refer to FIA Appendix J Article 253-16 for additional detail.

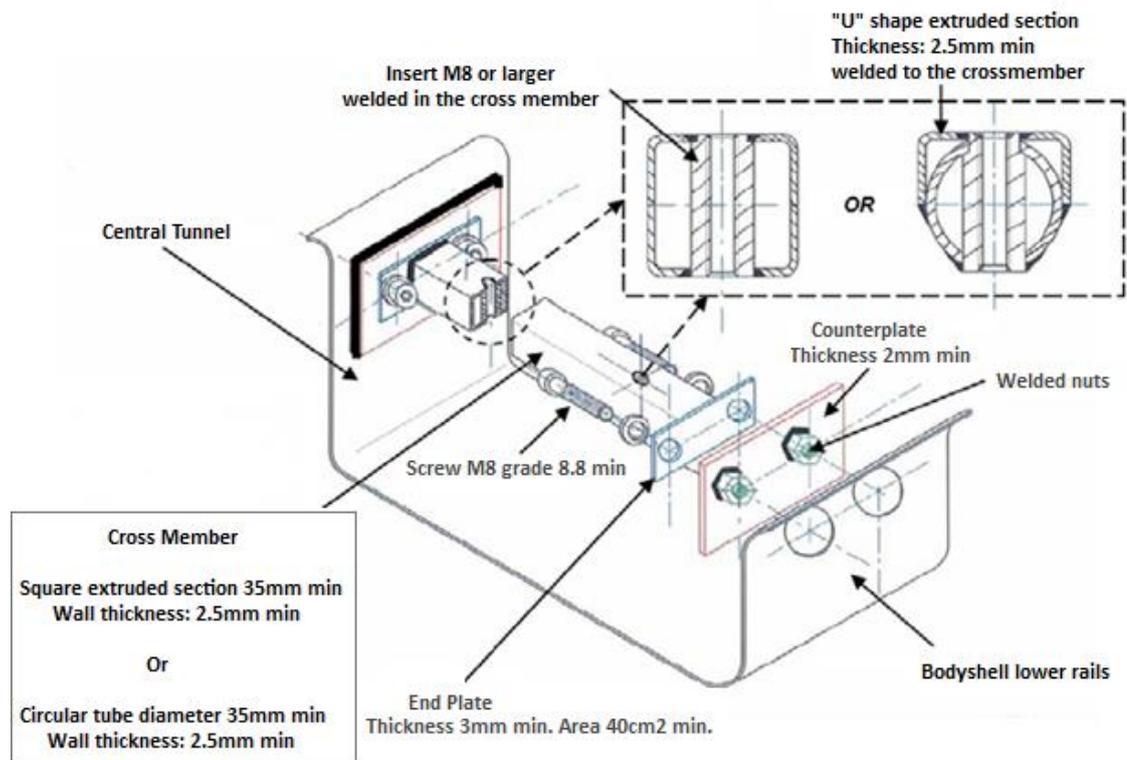


Figure A2(b)

- (c) The cross member detailed in (b) may alternatively be fully welded to a steel reinforcement plate which is at least 3mm thick and 40cm<sup>2</sup> area which is welded directly to the bodyshell. Refer Figure A2(c).

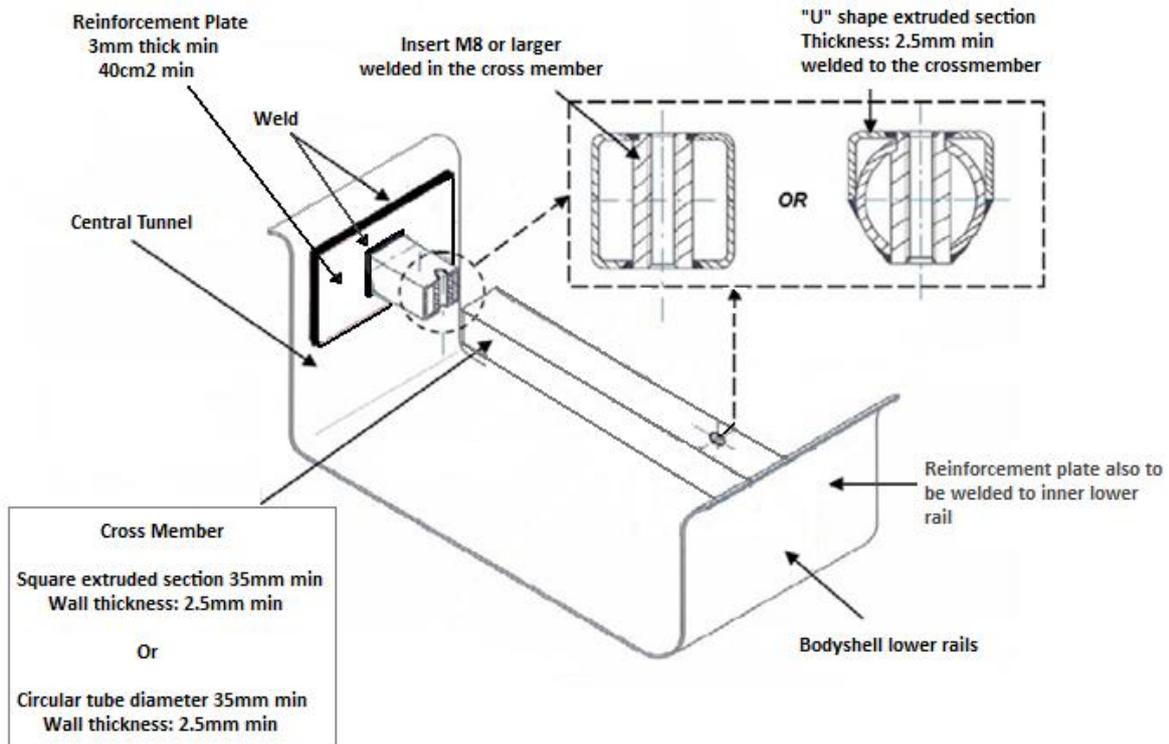


Figure A2(c)

- (d) Anchorages homologated by the manufacturer with the FIA or an Approved Organisation.
- (e) Any other method assessed and certified by a Licensed Certifier for compliance with the ADR 3/03 *Seats and Seat Anchorages*.

### A3 SAFETY HARNESES AND THEIR ANCHORAGE POINTS

A safety harness must be anchored in accordance with one of the following:

- (a) On a series production automobile, on an unmodified seat belt mounting point.
- (b) If a safety harness is affixed to a steel body shell in a non-standard location, the body shell must be free from rust and damage and each attachment point must be reinforced by the use of a plate not less than 75mm x 50mm x 3mm thick in accordance with Figure A3;

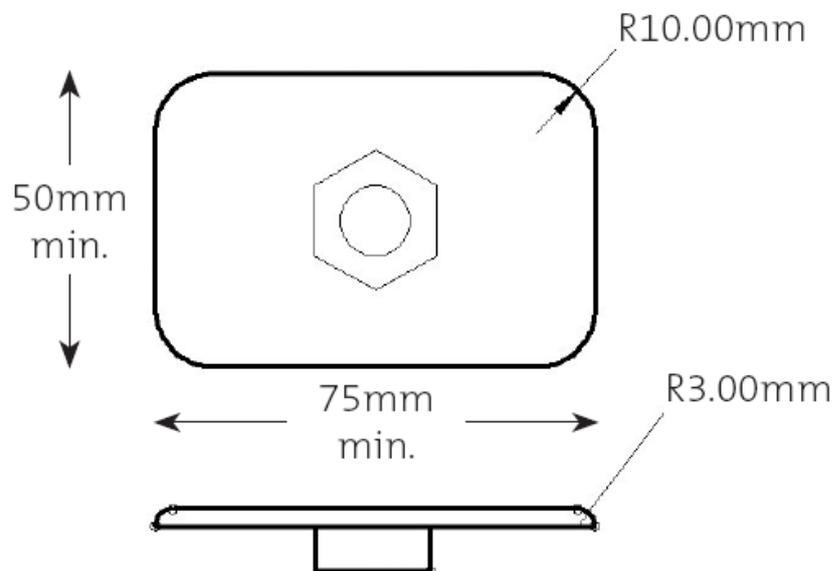


Figure A3:

- (c) If mounted to a safety cage, the member it is attached to must be not less than 38mm x 2.4mm or 40mm x 2.0mm cold drawn steel with a minimum tensile strength of 350 N/mm<sup>2</sup> or otherwise engineering certification must be provided to confirm that each anchorage point is able to withstand a load of 147kN, or 72kN for the crotch straps.
- (d) Any other method assessed and certified by a Licensed Certifier for compliance with the ADR 5/05 *Anchorage for Seatbelts*.

Each bolted anchorage must be suitable for a 7/16" UNF bolt.

The angles at which the harness straps are mounted must comply with FIA requirements.

## APPENDIX B

### RUNNING CLEARANCE

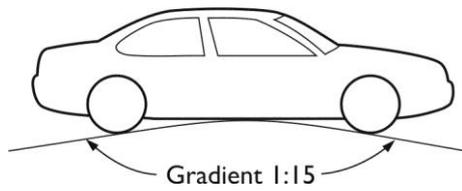
The running clearance of a Rally Vehicle must not be less than 100mm.

In addition, the ground clearance should be sufficient to allow the fully laden vehicle to negotiate common features, such as peaks and troughs in the road, drains, culverts and traffic calming devices without scraping parts of its under-body along the ground.

Note: A fully laden vehicle should be able to pass over a peak in the road with the gradient on either side of 1:15 if the wheels of one axle of the vehicle are on the slope on one side of the peak and the wheels of the next axle are on the slope of the other side (see Figure B1).

FIGURE B1: GROUND CLEARANCE OVER PEAK IN ROAD

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## APPENDIX C

### ABRIDGED BRAKE TEST FOR DEDICATED RALLY CARS

The following inspection and testing procedure may be done to confirm the suitability of modified braking systems for use in Rally Car Conditional Registration Scheme. The testing and assessment would be conducted or supervised by a competent Approved Organisation Scrutineer or a Licensed Certifier.

The references to Tests below refer to those in the document *Brake assessment manual*.

The person doing the inspection and testing must apply the following procedures:

1. Inspect all components to check that:
  - a. Mounting brackets are adequate.
  - b. Clearances are adequate from all components.
  - c. Brake hoses are of the appropriate type; they have adequate clearance; are of correct length; and are otherwise suitable for their application.
  - d. Booster and vacuum supply hoses are protected from heat, and adequately secured and supported.
2. Conduct a reservoir volume check or verify that a fluid level warning lamp is fitted. (Refer to Test A.)
3. Perform a brake swept area check. Brake swept area must be equal to or greater than the original vehicle. If the vehicle mass has increased from the original vehicle, the swept area must increase at least in proportion. (This is used instead of Tests K, L, M and N.)
4. Do a test of the master cylinder mounting structure and pedal using a 1000N load applied with the vehicle stationary; there must not be any permanent deformation and the master cylinder or pedal must not bottom-out. (This is the same as Test B.)
5. Do a park brake test; if mechanical and hydraulic handbrakes are fitted, both must be tested. The handbrake must hold against the engine in low gear under light throttle in both first and reverse gears. (This is the same as Test C.)
6. Conduct three Spike Stops, from 20km/h, with minimum 500N pedal effort applied within 0.4s of brake application, then re-inspect all brake mountings to ensure there is no deformation. (This is as per Test H, modified speed.)
7. Do a full plate-type brake test. The results must show a peak deceleration of a minimum  $6.43\text{m/s}^2$  (65% of g) at a pedal effort less than 680N; and a minimum average deceleration of  $4.9\text{m/s}^2$  (50% of g). Brake force distribution left to right must be within 10% front and 20% rear maximum side difference; or a maximum 10% difference; or 350N. Front and rear hydraulic circuits must be clearly seen to function. (This replaces Tests I and J.)
8. In vehicles with no mechanical hand brake, do a partial fail test for each circuit on a plate-type brake tester. A minimum peak deceleration of  $2.44\text{ ms}^{-2}$  (25% of g) must be recorded for each circuit at a pedal effort less than 680N. If a mechanical handbrake is fitted and has passed the park brake test, a partial fail test is not required. (This is the same as Test D.)